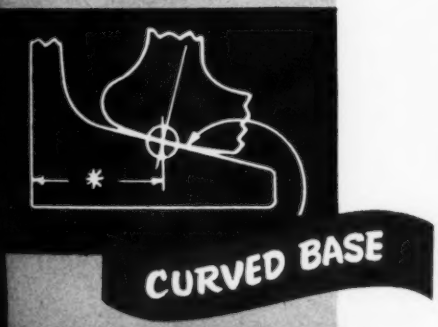
Modern Rail Joint *Design*

HEADFREE — Introduced in 1922. Is now standard on majority of railroads in the United States and Canada. 33 million joints purchased by railroads. Added features with improved design give increased strength and stiffness, using less metal at lower cost to the railroads. No material weakness developed during this period. HEADFREE feature is no longer a theory—it is an established fact.



CURVED BASE — Has proven to be one of the outstanding improvements in rail joint design. It facilitates mill practices under necessary and permissible tolerances. It adjusts itself to irregularities in rolling. Used now to a large extent on Head Contact joints, largely reducing tendency to cock joints on application. Cocking materially reduces efficiency of this type of joint which in turn reduces life of both joint and rail.

CENTER LATERAL OVERFILL — Another feature already proven which facilitates better initial fit, reduces loss in bolt tension and lengthens life of joint and rail.

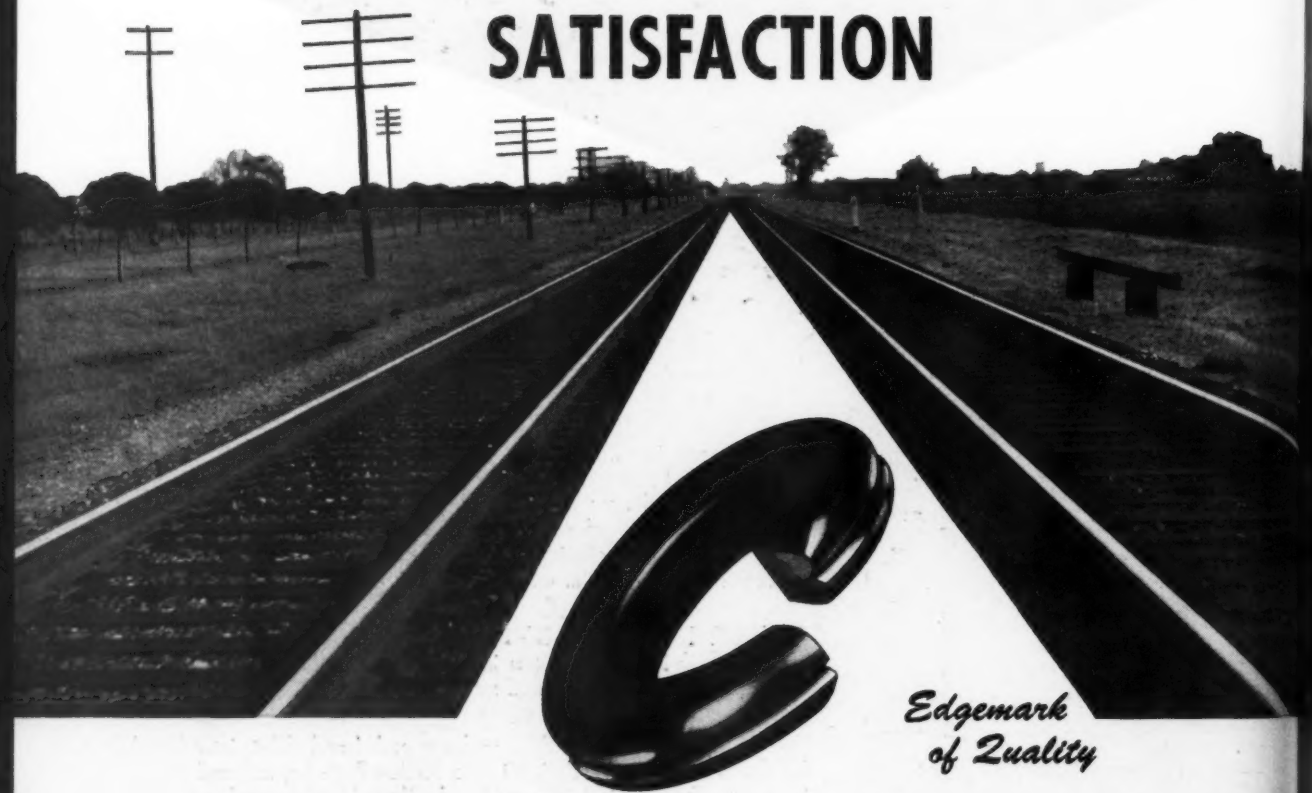
IMPROVED HEADFREE — Increased head fillet introduced for the first time in rail design in the Torsion Resisting rail and which is now embodied in all new proposed rail sections has made possible the greater head fillet bearing at the point of greatest stress. Gives increased stiffness, preponderance of strength in head to reduce fatigue failures, at the same time retaining balanced ratios of proven value.

To sum up—the outstanding proven advantages of the Headfree and Improved Headfree joints are:

Easy application . . . Initial contact at critical point . . . Increased take-up . . . Help in rail alignment, especially on curves . . . Practically complete elimination of fatigue failures.

Initial cost lowest per unit of strength . . . Saves in maintenance . . . Gives longer life to rail as well as joint.

STRAIGHTAWAY TO MAINTENANCE-OF-WAY SATISFACTION



Edgemark of Quality

Maintenance-of-way satisfaction covers a broad field. Reliance Hy-Pressure Hy-Crome Spring Washers are a small but very important part of this program. Today, with high labor and track replacement and repair costs, a satisfactory track condition with all rail joint bolts tight is the first step to efficient maintenance-of-way for operation.

Reliance Hy-Pressure Hy-Crome Spring Washers have proven their worth over many thousands of miles of track for long periods and have given complete satisfaction on many roads. They provide a *straightaway* to *maintenance-of-way satisfaction.*

Have you tried Reliance Hy-Pressure Hy-Crome Spring Washers on your rail joint bolts? Try them and you will insist on them for future maintenance work.

EATON
EATON MANUFACTURING COMPANY

An interesting illustrated folder of Reliance Hy-Crome Spring Washers for track-work offers pertinent pointers on maintenance-of-way economy. Write for a copy.

OFFICES AND PLANTS MASSILLON, OHIO

Reliance Division

Sales Offices: New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Montreal

MAINTENANCE MEN

LOVE DATES

LIKE THESE....

They show years of dependable rust prevention, under conditions that accelerate corrosion. One coat application of NO-OX-ID invariably does the trick. NO-OX-ID can be brushed on over existing rust and scale. It penetrates down to the parent metal, where it stops further corrosion. Rust scale will loosen under NO-OX-ID's chemical action, bare areas may appear, exposing parent metal. All that is required is touching up of these patches. With this easy effective application, NO-OX-ID saves up to 50% of ordinary maintenance cost.

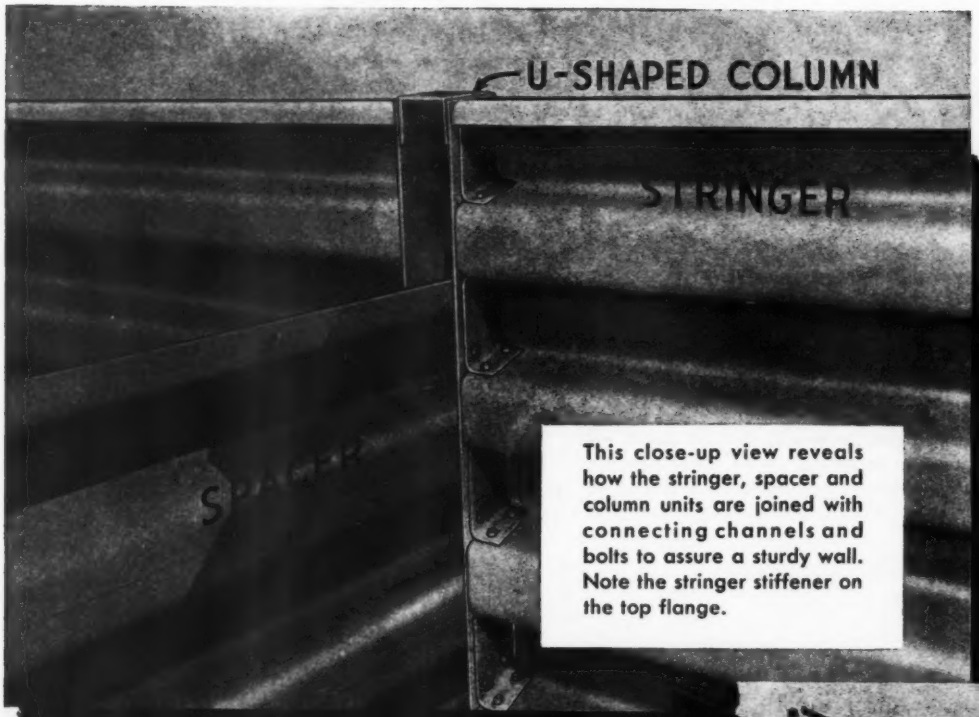
LONG-TIME DEPENDABLE PROTECTION

AGAINST CORROSION . . .

The ORIGINAL RUST PREVENTIVE

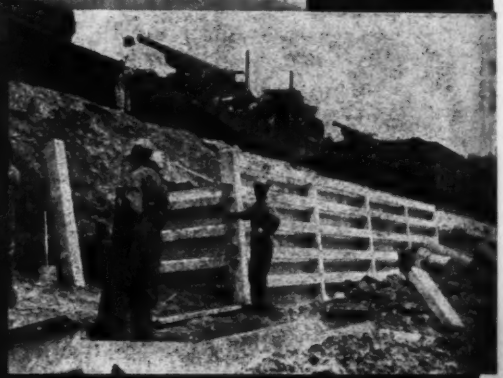
Dearborn Chemical Company
Dept. U, 310 S. Michigan Ave., Chicago 4, Ill.
New York • Los Angeles • Toronto

Published monthly by Simmons-Boardman Publishing Corporation, 105 W. Adams St., Chicago 3, Ill. Subscription price: United States and Possessions, and Canada, $3.00; Foreign $3.00. Single copies 35 cents. Entered as second-class matter January 20, 1933, at the post office at Chicago, Ill., under the act of March 3, 1879, with additional entry at Mount Morris, Ill., post office. Address communications to 105 W. Adams St., Chicago 3, Ill.



This close-up view reveals how the stringer, spacer and column units are joined with connecting channels and bolts to assure a sturdy wall. Note the stringer stiffener on the top flange.

steel bins that *"put the brakes"* on erosion



When erosion attacks embankments it brings "slow downs," high maintenance and plenty of headaches to railroad men. And unfortunately most steep slopes and embankments are easy prey for sharp-biting erosion and other unstable conditions.

Many maintenance engineers solve these problems by installing ARMCO Bin-Type Retaining Walls.

These sturdy walls overcome unequal settlement without cracking or bulging. They are easy to erect and unskilled men can do the work in any season, with less excavating. To prevent undermining, backfilling is done as the work progresses.

Economy and efficiency go hand in hand. Closed-face construction prevents loss of material from individual bins. ARMCO Bin-Type Walls can be salvaged for use elsewhere or changed to meet other conditions.

Get all the facts about ARMCO Retaining Walls. You'll find them a money-saving investment. Write the Armco Drainage & Metal Products, Inc., 4265 Curtis St., Middletown, O.

more scrap means more steel

We urge you to collect every pound of iron and steel scrap, including unused and obsolete equipment. Speed it to the steel industry through your regular channels. Present high production cannot be maintained unless more scrap is shipped to the mills promptly. The situation is critical.

ARMCO

ARMCO BIN-TYPE RETAINING WALLS

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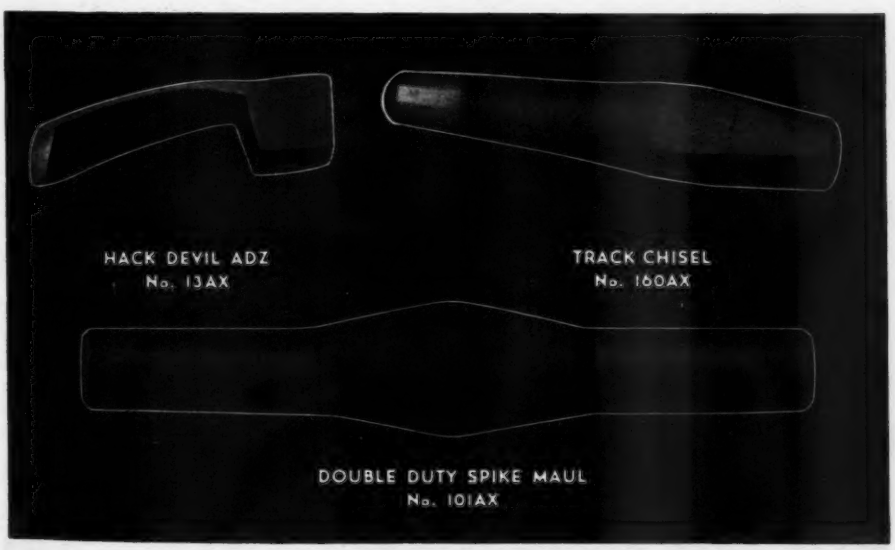
Years ago, Warren Tool Corporation went to work to develop heavy hand tools which would give longer and safer service. The tools had to have higher hardness, greater toughness, and more resistance to abrasion. A new line had to be manufactured and the first tool to be demonstrated to the railroads was the "Hack Devil Adz." This tool introduced a new trade name (DEVIL), and a new material for heavy hand tools . . . ELECTRIC FURNACE ALLOY TOOL STEEL.

The outstanding performance of the Hack Devil Adz soon gained an enviable reputation for safety and economy. Hence, the Slug Devil Spike Maul and the Cut Devil Track Chisel, made of electric furnace alloy tool steel, were soon developed for the trade. And today practically all railroad maintenance men recognize the economy and safety of the Devil Line which is complete.

An easy-to-use Warren Tool Catalog No. 10 and AREA Bulletin No. 4 give complete details on plans and specifications.

Write for your copies today.



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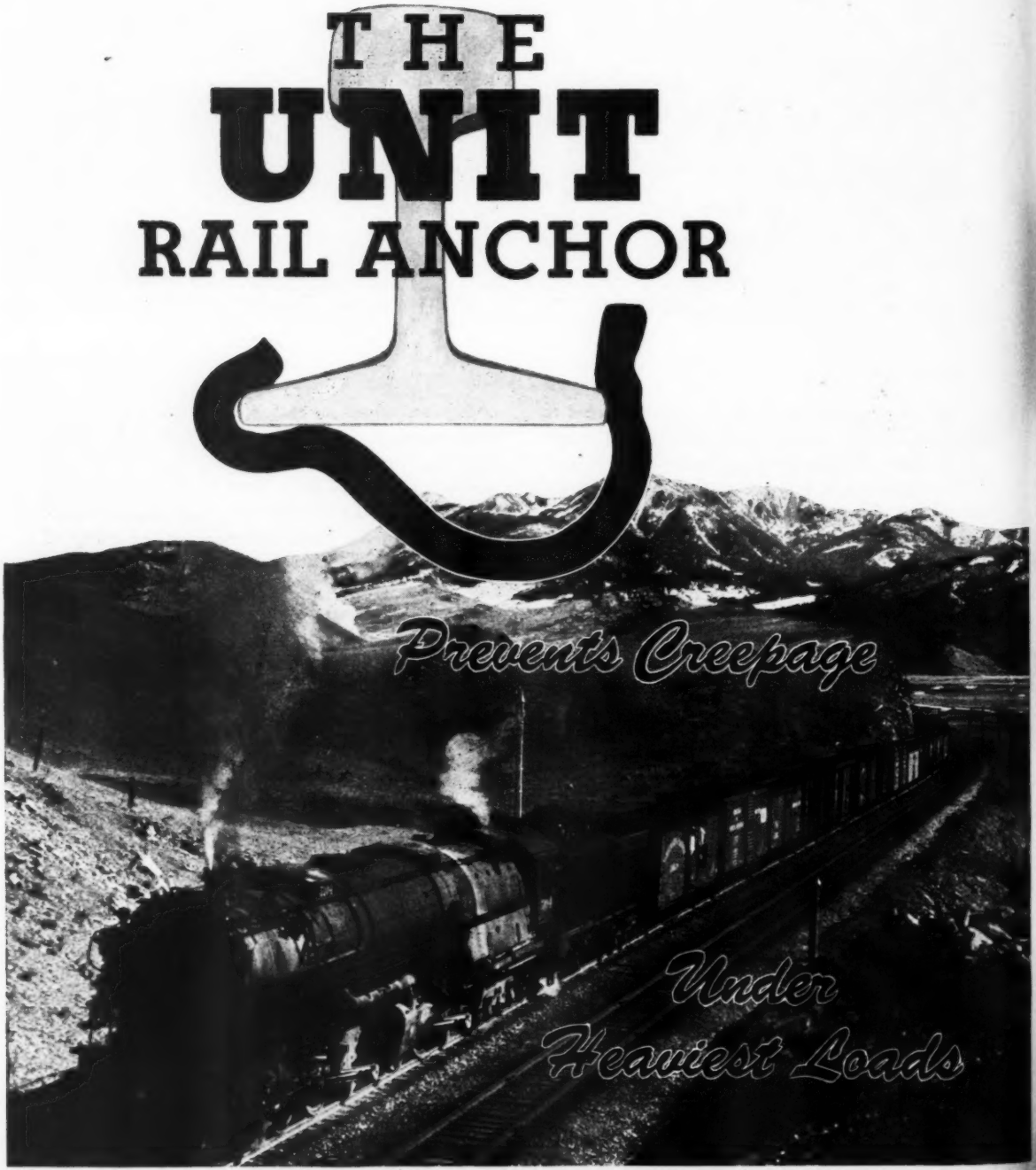
THE UNIT RAIL ANCHOR



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UNIT RAIL ANCHOR COMPANY, INC.
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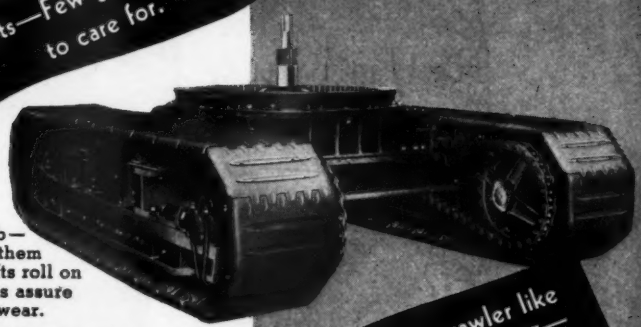
you can't have TOO MUCH Dependability!

Simple—Only two main shafts—Few gears—Easy to care for.



No other crawler like this—easy steering—travel gears fully protected!

NORTHWEST Shovels, Cranes and Draglines start the job—*and finish it!* Simple design, simple construction makes them easy to care for. There are few parts, few gears. All high speed shafts roll on ball or roller bearings. Cast steel machinery side frames assure the maintenance of alignment, eliminating weaving that causes wear.

Easy steering permits traveling over rail and ties. Crawler tread joints are closed and treads will not hook or catch on rail. Travel gears are fully enclosed. Conversion from crane or dragline to a shovel is quick and easy. Transportation to the job is possible on a standard flatcar or by trailer, and Northwests load and unload themselves under their own power, fully erected.

Northwest dependability has been proved on the Nation's leading railways. Ask for details and let us tell you what Northwests are doing for others.

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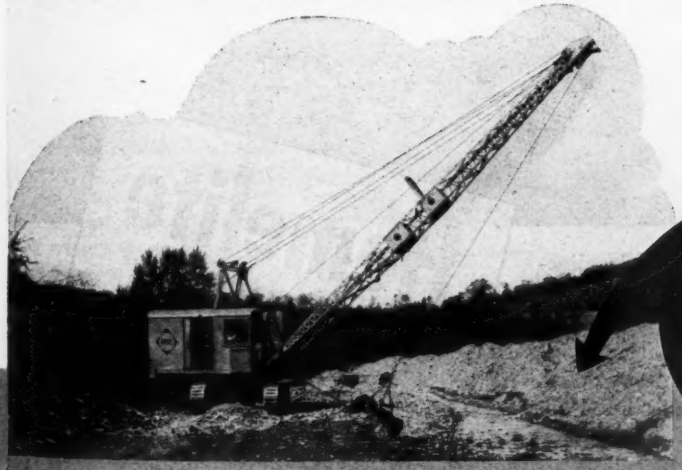

YOU CAN'T DO THIS WITH A TRACK CRANE

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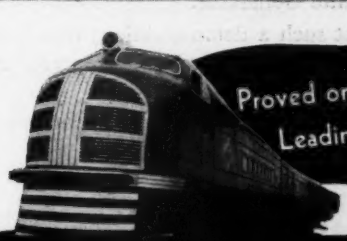
THE ALL PURPOSE RAILROAD MACHINE
SHOVEL • CRANE • DRAGLINE • PULLSHOVEL



Proved on the Nation's Leading Railways

Their Performance Speaks Louder Than Words

Above — A Homelite Generator on the job furnishes plenty of power to operate time-saving electric saws.

Below — A Homelite Pump and Generator make the right combination for speeding dewatering jobs at night.

We'd much rather show you Homelite Portable Gasoline-Engine-Driven Pumps and Generators *in action* than just talk about them. Action speaks louder than words.

So why not let us give you a free demonstration... any place you want it. See how fast a Homelite pumps, how quickly it primes itself, how easily it handles heavy liquids and solids. See all the cost-cutting operations you can put to good use on day or night work with steady electric power furnished by a handy Homelite Generator.

To get such a demonstration, free from all obligations, simply write. We'll have our nearest representative get in touch with you.

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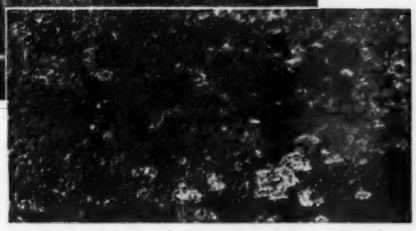
Portable Pumps Generators and Blowers
GASOLINE-ENGINE-DRIVEN

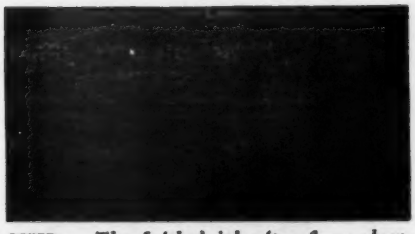
Start of flame-cleaning operation on water tower structure

It's Flame Cleaning

the fast, economical method for Preparing Railroad Steel Structures for Painting



BEFORE — *Close-up view shows conditions of paint-lift heavy rust and scale that were met.*



AFTER — *The finished job after flame cleaning. A smooth, clean, dry surface ready for a lasting coat of paint.*

QUICKLY, easily and safely applied, the Airco flame cleaning process provides a clean, warm and dry surface conducive to a lasting paint job. The oxyacetylene flame cockles old paint, loosens rust and drives off hidden moisture . . . gives longer paint life to all kinds of steel structures.

In planning new steel structures exposed to weather, prepare before you paint for economical maintenance. Flame clean all steel parts before applying the prime coat of protection. This method loosens the semi-tenacious mill scale. No dirt or moisture left to start corrosion. Reduces future maintenance costs to absolute minimum and gives longer life to the paint job.

For further details write for folder ADG-1066B—"Flame Cleaning and Dehydrating Old Steel Structures," and folder ADG-1067A—"Flame Cleaning and Dehydrating New Steel Structures." Address: Air Reduction, General Offices: 60 East 42nd Street, New York 17, N.Y. In Texas: Magnolia Airco Gas Products Company, Houston 1, Texas. Represented Internationally by Airco Export Corporation.

ADVANTAGES OF OXYACETYLENE FLAME CLEANING

1. Provides a clean, warm and dry surface conducive to a lasting paint job.

2. Easily used inside the shop or in the field because of the extreme portability of the apparatus.

3. No special technical skill required.

4. Saves time and money in steel structure preparation.

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YOU GET A LOT MORE THAN THE BEST EQUIPMENT

When You Buy JACKSON Tampers and POWER PLANTS

A four-tool outfit, 4-face-tamping and the multiple jack method of raising — an excellent setup your JACKSON Field Man can be helpful in organizing.

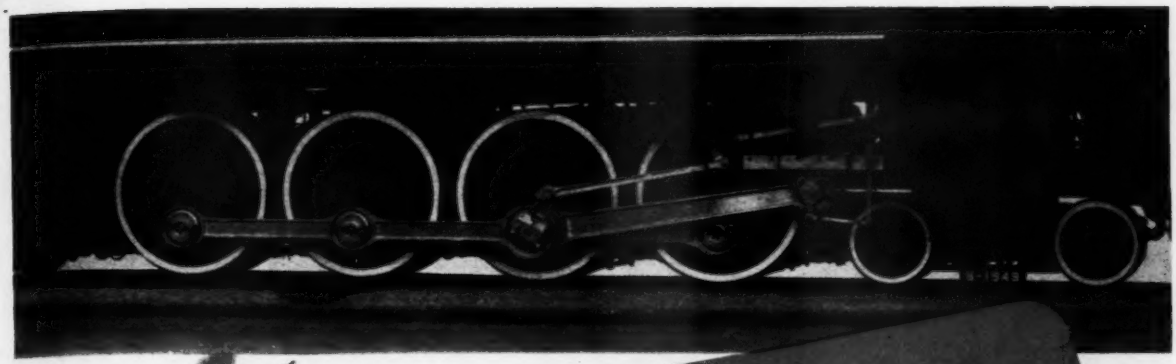
An 8-face operation, even in tombstones like these, is duck soup for JACKSON Tampers properly used — Ask your JACKSON Field Man.

Loosening cemented ballast with speed that crowds the shovelers, is just one of many advantageous uses your JACKSON man is ready to demonstrate.

As near to you as your telephone, and available on call, is a JACKSON District Field Engineer — thoroughly schooled by years of experience in track maintenance methods and the ways in which JACKSON equipment can be used to far outstrip any other tie-tamping equipment in quantity and quality of track maintained.

It's his job to aid and instruct the men who will use it — to confer or consult on new or unfamiliar work — to see that the maintenance of the equipment is thoroughly understood. In short his sole purpose is to see that you get the utmost returns on your investment. And the results have been so uniformly good that with more than 4 out of 5 of America's leading railroads, JACKSON Tampers and Portable Power Plants are standard equipment. Complete information on JACKSON Tamping Equipment and methods will be gladly sent to you on request.

ELECTRIC TAMPER & EQUIPMENT CO., Ludington, Michigan



The same bearings that are free from speed restrictions on modern locomotives, cars and streamlined trains; that keep them on the job — out of the repair shop, give section motor cars and trailers better performance, greater endurance, lower maintenance.

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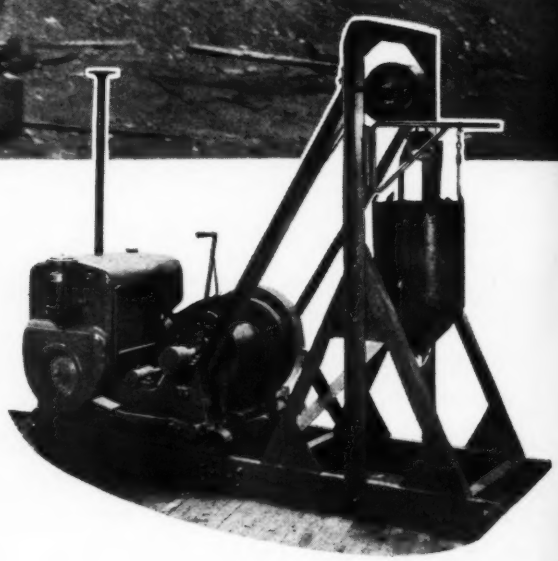
TAPERED ROLLER BEARINGS

Pile of rubbish removed from 16" yard sewer.

The RIGHT Tools for the Job



Power winch cleaner used on job shown above

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Let us show you how you can save your railroad money through our contract pipe cleaning service. Just call or write our office nearest to you.

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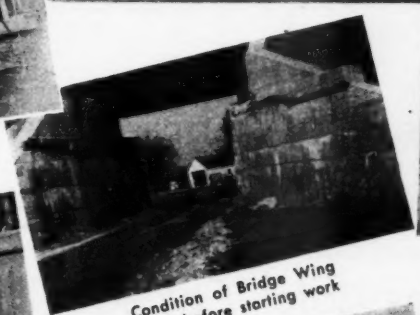
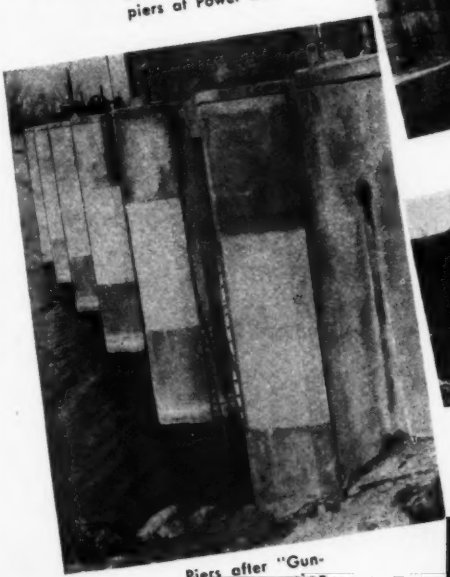
Years of experience, coupled with modern equipment, enable us to successfully handle any restoration job—large or small. Always under the supervision of an expert. Bound to give you satisfactory service.

Disintegrated intake piers at Power Dam



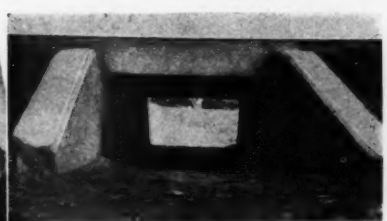
Condition of Bridge Wing Walls before starting work

After Restoration Service



Piers after "Gunite" Restoration

Note condition of disintegrated concrete Wing Wall at left



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Let a Detzel Engineer Help You . . .

with Your Masonry Maintenance Problems

GEORGE E. DETZEL COMPANY

Pressure Grouting and Gunite Service

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To the members and friends of the
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Association of America and the
American Railway Bridge and Building Association

The Woodings-Verona Tool Works and the Woodings Forge and Tool Company will exhibit the products of their manufacture at the Track Supply Association Exhibit in booth Nos. 93, 94 and 77.

We will be glad to greet you there on
September 16, 17, 18 and 19—
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EXHIBITOR
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SEPT. 16-17-18-19, 1946

WOODINGS-VERONA TOOL WORKS
WOODINGS FORGE and TOOL COMPANY
VERONA, PENNSYLVANIA

THIS SPEEDY TRACK TEAM KEEPS ITS BREATH

These fast runners don't get winded — and they make work easier for the men, too.

The Blue Brute Hand-I-Air Compressor has the easy-breathing Feather* Valve — lightest, tightest, most efficient ever made . . . handling 60 cu. ft. per min. without the slightest strain. The Hand-I-Air is compact, easily maneuverable, a cinch for two men to handle.

And those Blue Brute Tie Tampers—with their leak-proof throttles — are just as easy on themselves and on the men. No other tampers fill voids under ties so fast, yet no other tampers are as trouble-free. They're the lightest made, and they're perfectly balanced.

Also working on the railroad these days are such other Blue Brute Track Teams as: portable Diesel and gasoline engine-driven compressors and rail-car compressors teamed up with rock drills, trench diggers, backfill tampers . . . all famous for making less air do more work.

Investigate them further to see why *there's more worth in Worthington.*

Get more **WORTH** *from air with* **WORTHINGTON**

BUY BLUE BRUTES

EXHIBITOR
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*Reg. U. S. Pat. Off.

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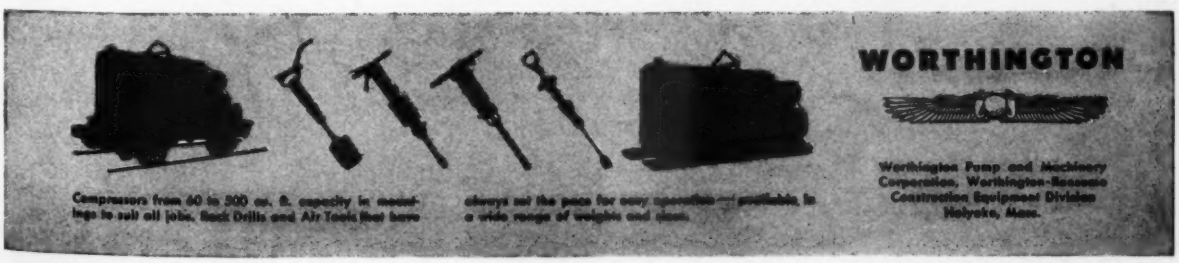
WORTHINGTON
Compressors from 60 to 900 cu. ft. capacity in mountings to suit all jobs. Rock Drills and Air Tools that have
always set the pace for easy operation — available in a wide range of weights and sizes.
Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division
Holyoke, Mass.

The Modern Way to Make the Grade

ENGINEERS and contractors confronted with exacting construction specifications and varying soil conditions are most enthusiastic in their endorsement of Monotube steel foundation piles.

Here's what they say:

"Driving is easier because of the fluted, tapered design. Our regular equipment does the job—no special driving rigs needed".

"Quick, simple field extensions often save hours and money".

"Tubular construction makes "top-to-toe" inspection possible—assures a good job".

Why not benefit from Monotubes' many advantages on *your* next construction job? They are available in gauge, size and taper to meet all of your requirements. For able engineering assistance, or additional information write The Union Metal Mfg. Co., Canton 5, Ohio.

The BUDA Model 130 Rail Bender is distinctly different in design — simple in construction — easy to attach and operate.

with the BUDA RAIL BENDER

Heavy stock and guard rail bends are easily made in the field by one man using a BUDA Rail Bender. The Model No. 130 consists of steel frame and 25 or 35 ton special journal jack. The jack has a specially shaped cap that takes a cylindrical bearing in the end of the hook for freedom of movement. The base of the jack is deeply slotted and flanged to secure its hold on the rail. A jack ram scale permits accurate duplication of bends. Send today for descriptive bulletins.

wherever there are railroads there is **BUDA**

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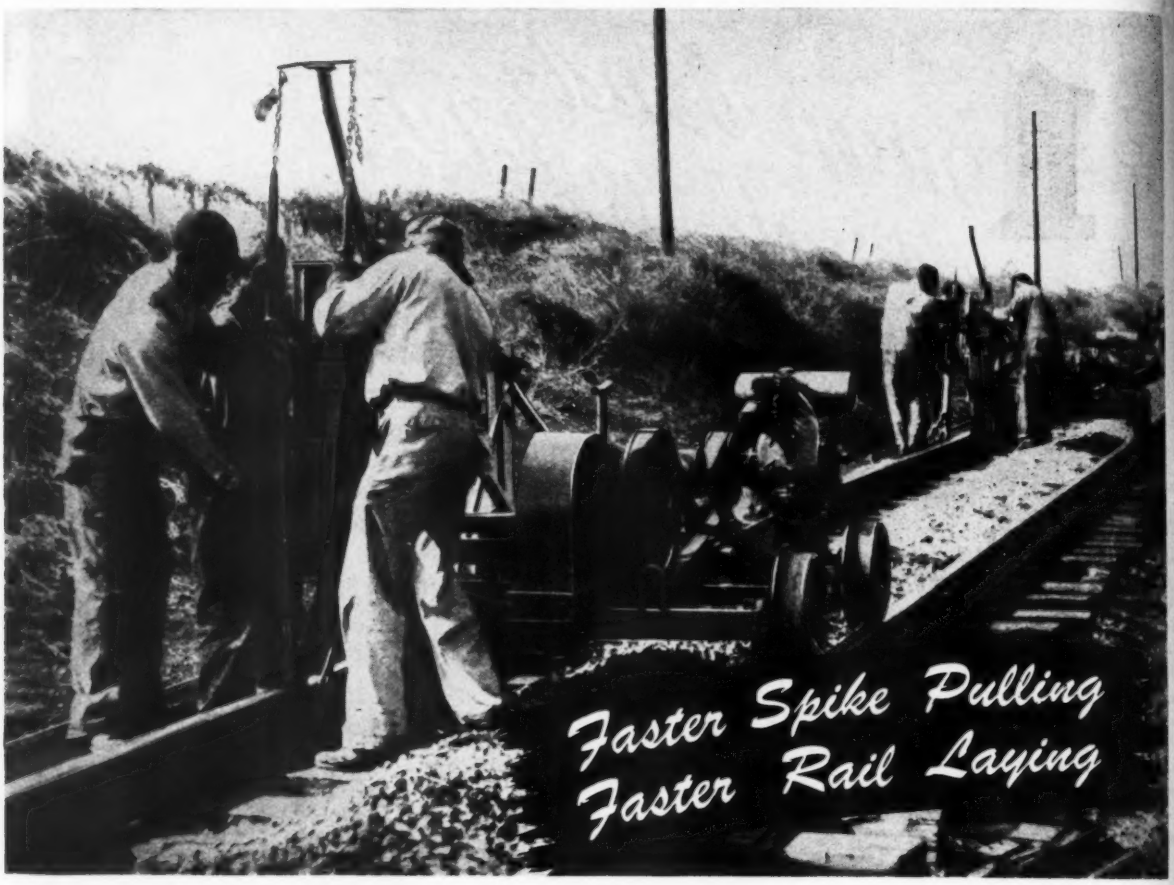

Nordberg Spike Pullers are at the head of most rail laying gangs since they are now standard equipment with railroads in United States and Canada. With Spike Pullers on the job, the old rail is taken out faster and the whole task of rail laying is speeded up. This is especially true at bridges, trestles, switches and other locations where spikes are hard to pull by slow and obsolete hand methods. In addition to faster progress, the cost of rail laying is materially reduced. Save time and money by equipping your gangs with this and other labor saving Nordberg Tools.

The Nordberg Line Of Power Tools

Spike Puller
Spike Hammer
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NORTHWESTERN

RAILWAY TRACK MOTOR CARS AND MAINTENANCE OF WAY EQUIPMENT

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581 85	NORTHWESTERN 581 85 POWER BALLAST DISCERS INTERNATIONAL 6 CYL. MOTOR, 85 H. P.
566W	NORTHWESTERN 566 W — B & B GANG CAR WAUKESHA FC 4 CYL. ENGINE, 36 H. P. — 8 TO 100 MEN.
514	NORTHWESTERN 514 ALL SERVICE SECTION CAR NORTHWESTERN 8-13 H. P. ENGINE — 8 MEN.
534	NORTHWESTERN 534 LIGHT SERVICE SECTION CAR BRIGGS & STRATTON AIR COOLED ENGINE, 6.4 H. P. — 6 MEN.
532	NORTHWESTERN 532 LIGHT ALL SERVICE CAR BRIGGS & STRATTON AIR COOLED ENGINE, 6.4 H. P. — 4 MEN.
535	NORTHWESTERN 535 ONE MAN INSPECTION CAR BRIGGS & STRATTON AIR COOLED ENGINE, 6.4 H. P. — 1 OR 2 MEN.
538	NORTHWESTERN 538 ONE MAN INSPECTION CAR BRIGGS & STRATTON AIR COOLED ENGINE, 6.4 H. P. — 1 OR 2 MEN.
540DA	NORTHWESTERN 540 DA RAIL AND FROG GRINDER DOUBLE HEAD TYPE, WIS. 4-CYL. AIR COOLED ENGINE, 22 H. P.
544	NORTHWESTERN 544 SELECTIVE RAIL JOINTER SLOTTER RAIL JOINT SLOTTER & BEVELER — B & S AIR COOLED ENGINE, 6.4 H. P.
519	NORTHWESTERN 519 BALLAST CAR ALL STEEL CONSTRUCTION — 16 CU. FT. CAPACITY.
500A	NORTHWESTERN 500 A WORK CAR STANDARD WORK CAR — 6000 LBS. CAPACITY.
500A12	NORTHWESTERN 500 A 12 HEAVY DUTY WORK CAR HEAVY DUTY WORK CAR — 10,000 LBS. CAPACITY.
562AD	NORTHWESTERN 562 AD WORK CAR AND GANG TRAILER HEAVY DUTY STEEL FRAME TRAILER — 10,000 LBS. CAPACITY — 24 MEN.
504	NORTHWESTERN 504 LIGHT WEIGHT MOTOR CAR TRAILER FOR TELEGRAPH CREWS — WEIGHT 350 LBS. — CAPACITY 1000 LBS.
ENGINES	NORTHWESTERN SECTION MOTOR CAR ENGINES REPLACEMENT ENGINES — 8-13 H. P. WATER COOLED.
EQUIPMENT	REPLACEMENT WHEELS, AXLES AND BEARINGS FOR MOTOR CARS, PUSH CARS AND TRAILERS.

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WRITE FOR COMPLETE CATALOG CONTAINING PRICES AND SPECIFICATIONS ON NORTHWESTERN RAILWAY TRACK MOTOR CARS AND MAINTENANCE EQUIPMENT

NORTHWESTERN MOTOR COMPANY, EAU CLAIRE, WIS., U.S.A.

COMPRESSION

Rail Anchors

EXHIBITOR
BRIDGE & BUILDING
TRACK SUPPLY
HOTEL STEVENS, CHICAGO
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Two-way holding and uniformly-held expansion at the rail ends make Compression Rail Anchors the logical choice of bridge engineers. They are integral parts of many important railroad bridges.

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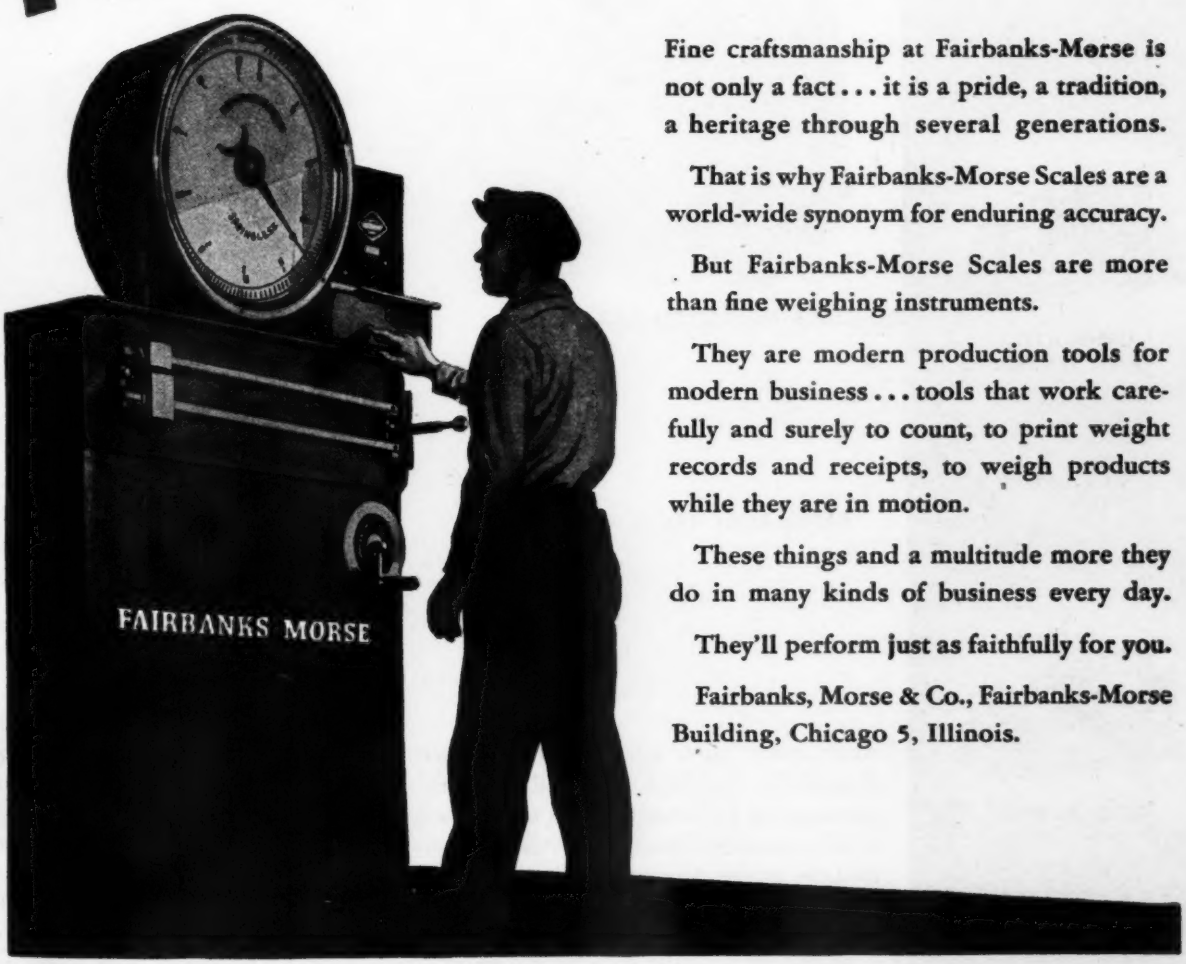

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That is why Fairbanks-Morse Scales are a world-wide synonym for enduring accuracy.

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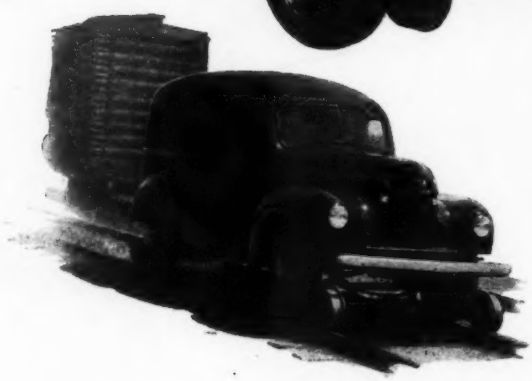
THE EVANS

OFFICIAL'S INSPECTION CAR



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After more than ten years of efficient dependable service on some of America's outstanding Railroads, EVANS will present a new standard line of job-tested AUTO-RAILERS at the Stevens Hotel during the Roadmaster's Association Convention, September 16 to 19.

Models K-3 and K-5, in the adaptations shown above are now in production at EVANS modern, new plant—and the A RAILER is also available as a chass which various types of bodies and e ment, illustrated herein, may be mou The automotive components are pro by one of the world's leading truck m facturers. Be sure to see the AUTO-R when in Chicago—and write now details and specifications.

SIDE DUMP TRUCK

OFFICIAL'S INSPECTION CA

AIR COMPRESSO

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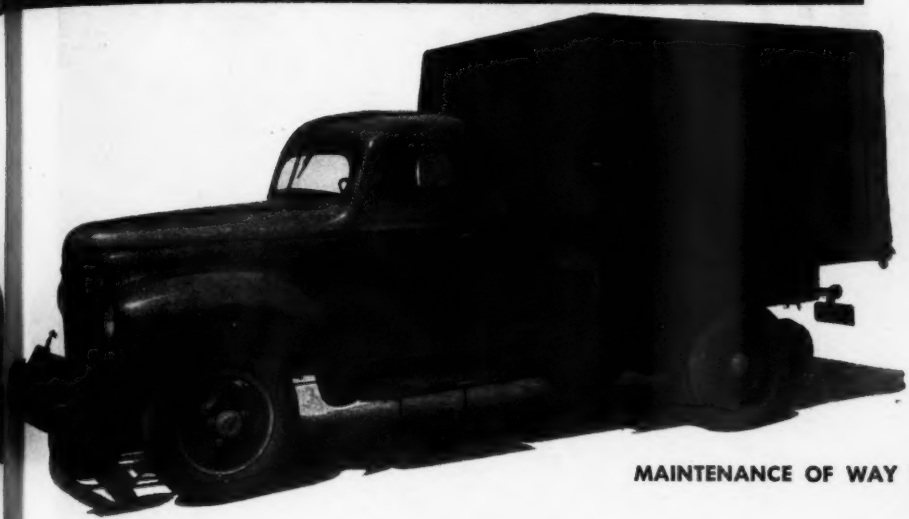
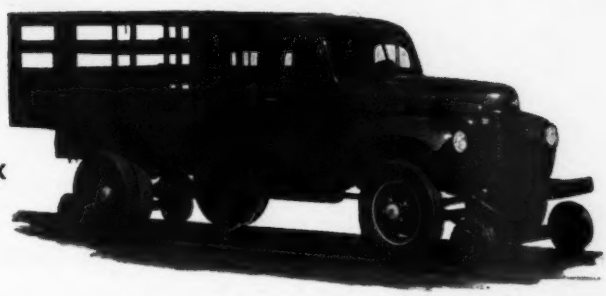
AUTO-RAILER*

SEE THEM AT THE STEVENS



MAINTENANCE OF WAY TRUCK



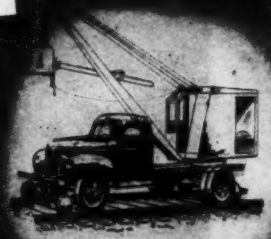
...STAKE BODY TRUCK

*T. M. Reg. U. S. Pat. Off.

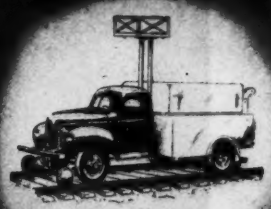
EVANS PRODUCTS COMPANY

AUTO-RAILER DIVISION

Detroit 27, Michigan



POWER SHOVEL



LINEMEN'S TOWER CAR

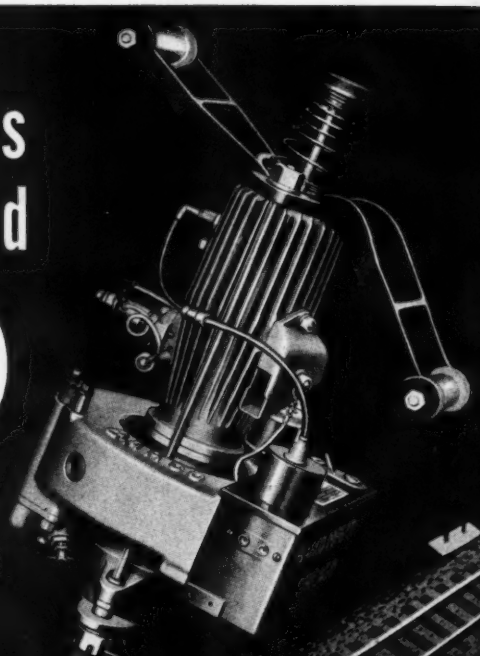
SALT SPREADER

...PRESSURE GROUTER

...SECTION CAR TRAILERS

BLADE PLOW

Better Tracks center around BARCO UNIT TYTAMPERS



Railroads all over the nation are using more and more Barcos to do better tamping, spotting, surfacing, cribbing and winter ice service. The Barco Tytamper is a fast, tireless hitter that maintains the safe, firm trackage so essential in these days of heavier traffic and manpower shortages. Self-contained ignition system makes for easy portability. Details sent on request.

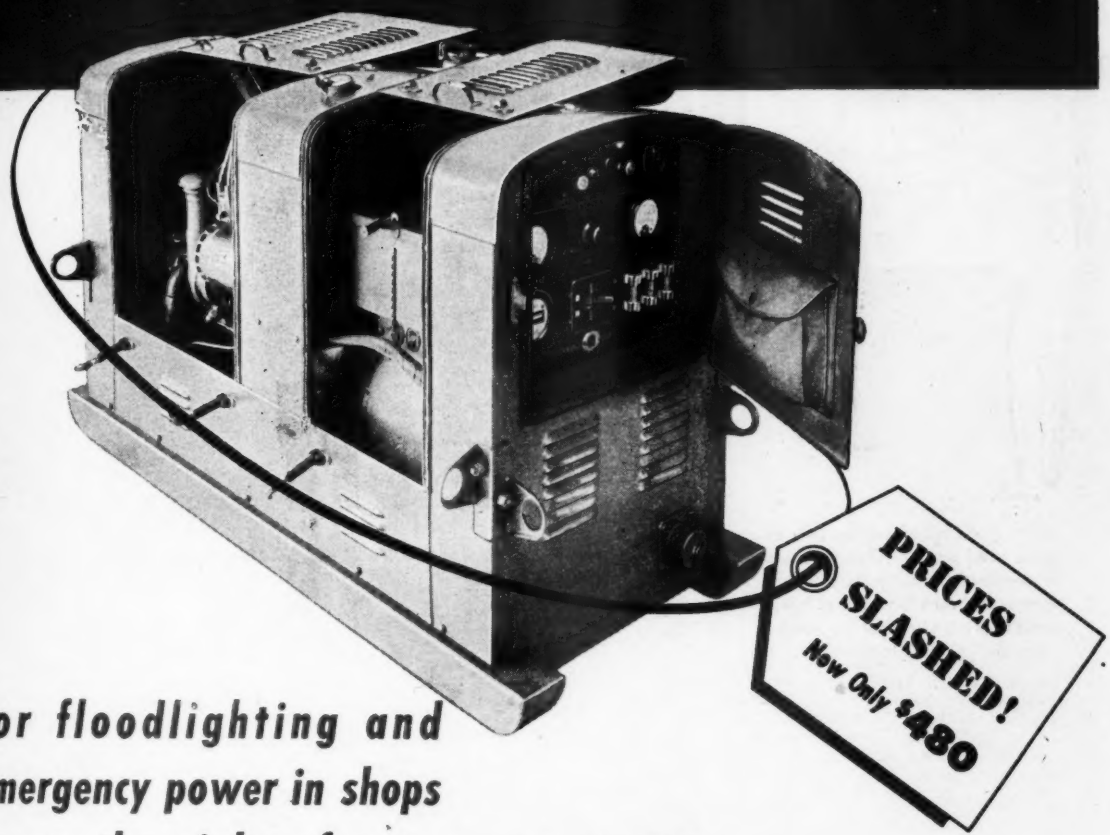
BARCO UNIT TYTAMPERS

FREE ENTERPRISE—THE CORNERSTONE OF AMERICAN PROSPERITY

BARCO MANUFACTURING CO., NOT INC. • **1805 Winnemac Avenue, Chicago 40, Illinois**

In Canada: **The Holden Company, Ltd., Montreal, Canada**

NOW AVAILABLE!



For floodlighting and emergency power in shops or on the right-of-way. Produces 3,000 watts of light.

This 3 KVA all-purpose engine-generator set that serves as prime source of electricity or fits into present circuits as a standby unit is now available for immediate shipment. Built to U. S. Army specifications, the units have been used only for test runs or standby service. Priced below the original cost, this 3 KVA 3-phase or single-phase unit is sturdy and fully enclosed against weather.

PARTS: Ample supply of parts is available.

SPECIFICATIONS:

ENGINE: Gasoline, 4-cylinder Hercules model ZXB, develops 11 horsepower at generator speed.

GENERATOR: 3 KVA AC., 115, 120 or 125 volts, *3-phase or single-phase,* 60-cycle at 1200 rpm, 50-cycle at 1100 rpm.

EQUIPMENT: Self-starter which operates on a vehicle-type, 6 volt battery (battery extra), oil filter, oil bath air cleaner, manual choke, gasoline gauge, gas strainer. *Control panel:* Main switch, circuit breaker and fuses, frequency meter, voltmeter and ammeter, charging ammeter, oil pressure gauge.

WEIGHT: 900 lbs. Compactly built, the unit consists of engine, generator, switch board, and gas tank, all mounted on skids for easy transportation.

HOW TO BUY: List price of $480.00 f.o.b. Sidney, Nebraska, Anniston, Alabama or Los Angeles, California. Terms, cash; or 10% cash with order, balance sight draft bill of lading. 30% discount to dealers.

THESE WON'T LAST — ORDER NOW! Write, wire or phone:

SOLD BY

GREENE-HALDEMAN COMPANY, INC.

World's Largest Chrysler Dealer

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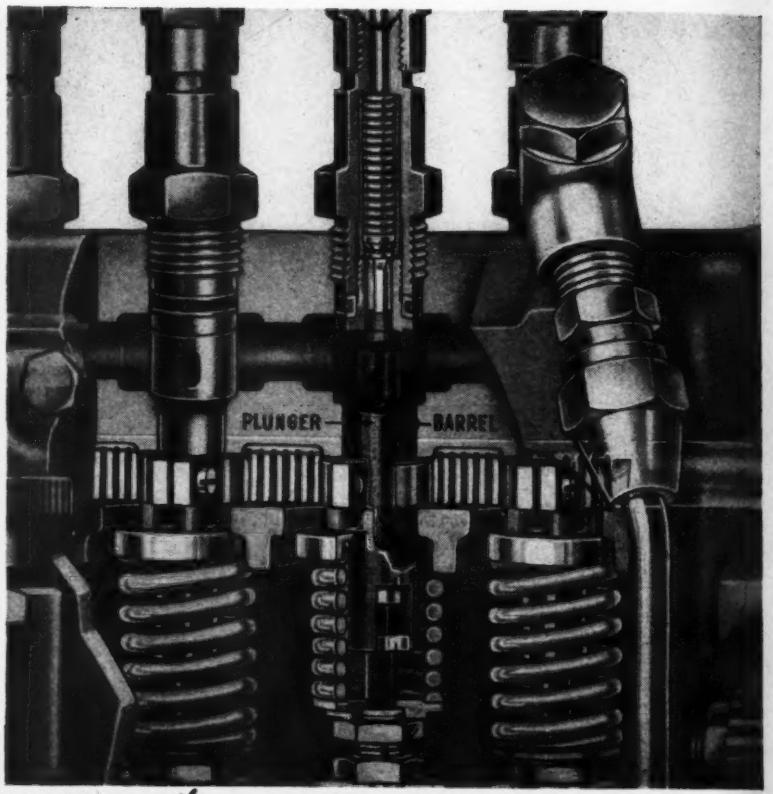
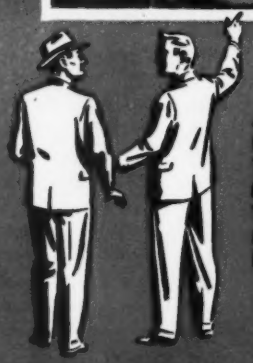
GOOD FUEL INJECTION

Have Friendly Parts

ANY MACHINE can be only as good as its parts. When precision is measured in millionths as in an American Bosch Diesel Fuel Injection Pump it is vital that the parts be "friendly" — each to the other.

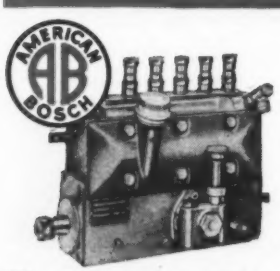


AMERICAN BOSCH Fuel Injection Systems have "friendly" parts. For example, look at the elements that put the fuel under injection pressure, called the plunger and barrel. The fit of these two parts actually *is* measured in terms of millionths of an inch. So the exacting resources of metallurgy are employed to make sure that the metals of each component are stable and that they will remain that way.



ALL PARTS of American Bosch Fuel Injection Systems are "friendly parts". The result is better engine performance for longer life — and friendly customers. That's why American Bosch equipment is standard on so many of America's Diesel Engines.

Write for a complete directory of American Bosch authorized service stations.



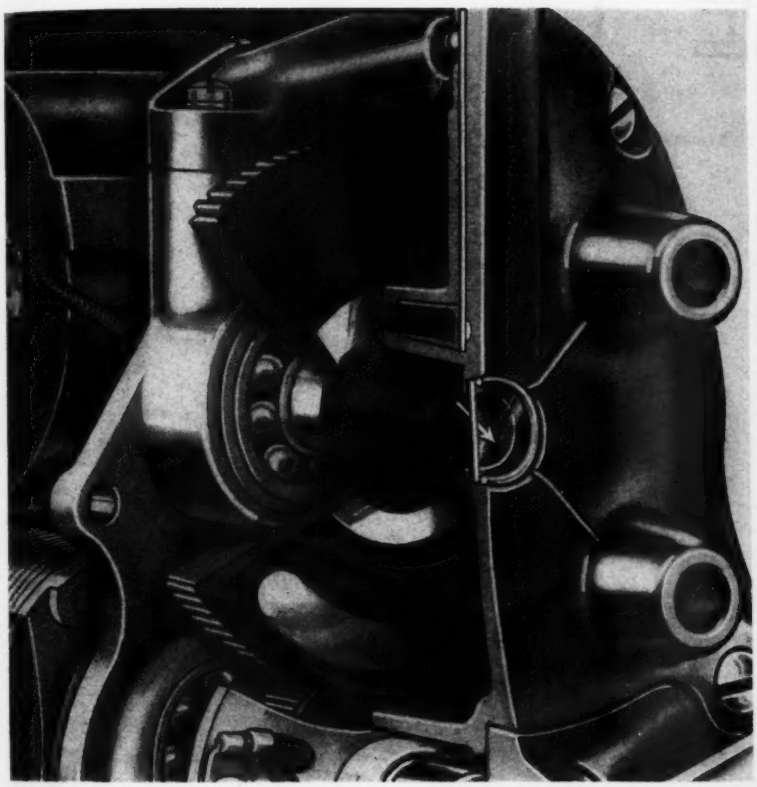
AMERICAN BOSCH CORPORATION

AMERICAN

Diesel Fuel Injection

AND GOOD MAGNETOS

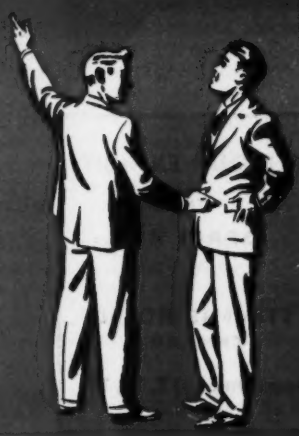
-to win firm friends



"HERE'S A MAGNETO that has made a lot of friends for me over the years . . . among people engaged in transportation, construction, road building, mining and farming. They've found it more than satisfactory, for one good reason."

"IT HAS FRIENDLY PARTS. The American Bosch Magneto keeps on pleasing my customers for that very reason. The generation and distribution of current within the magneto involves a fine balance in the design and choice of materials so that a proper relation of maximum conductivity and minimum wear is maintained. For example, the brush and distributor rotor are friendly to each other. It's the same with all parts. What little wear there is, is even. And that makes for longer life."

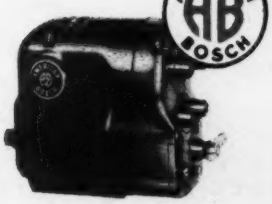
"IT'S A GOOD INVESTMENT to standardize on American Bosch Super-Powered Magnetos for all your needs. You get a liberal trade-in allowance. And you can look forward to years of economical service. Best of all, this magneto will make you a friend of mine as it has so many others."



SPRINGFIELD 7, MASS.

BOSCH

Super-Powered Magnetos



SAVE TIME . . . . in bridge work

SEE OUR EXHIBIT
in
SPACE 41
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STEVENS HOTEL
CHICAGO
September 17, 18, 19

CP-365 PNEUMATIC WRENCHES (Impact Type) quickly pay for themselves by the hours they save. No tools are faster or easier to use for running on or backing off nuts, or for the application or removal of bolts, studs and lag screws. Their good balance, light weight, minimum vibration and ease of handling greatly reduce operator fatigue.

With a capacity up to 1¼" bolt size, the CP-365 Wrench is furnished either with side handle or pistol grip, also in angle models.

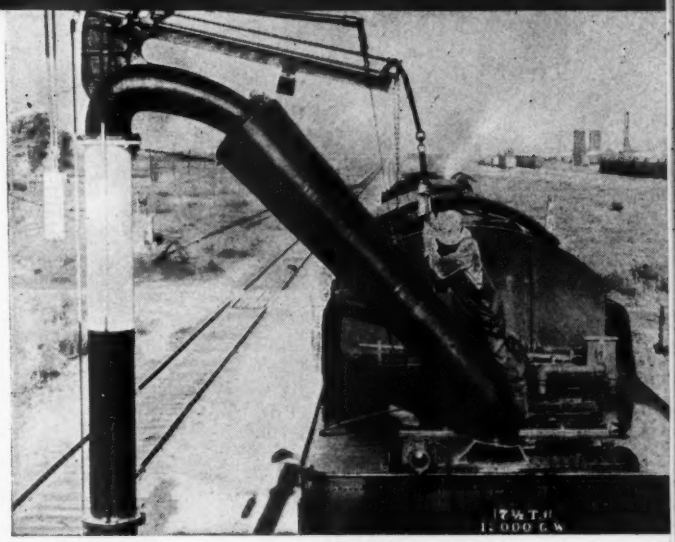
Other CP Pneumatic Wrenches (Impact Type) are available in capacities ranging from ¼" to 1¾" bolt size. Write for information.

CHICAGO PNEUMATIC TOOL COMPANY
General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

DOWELL

when minutes mean dollars!



water lines cleaned the chemical way handle more water—faster!

Men responsible for maintaining railroad schedules are well aware that an adequate supply of water is essential. They know that a few minutes saved at each watering station means many dollars saved.

The Dowell method of chemically dissolving accumulated scale is the modern, rapid method of cleaning important water lines . . . under ground, above ground—indoors or out! Leading railroads, utilities and other industries have found it practical, reliable and economical.

Dowell specialists offer a complete chemical cleaning service. They analyze samples of deposits taken from *your* lines, prepare the proper solvents—and furnish all necessary equipment to control completely every step of this thorough cleaning operation.

FREE SHOWING! Now available—a new 18-minute sound slide film illustrating the possibilities of Dowell Chemical Scale Removal Service. A Dowell representative will gladly arrange a special showing at your plant, office or organization meeting. Call or write Dowell today.

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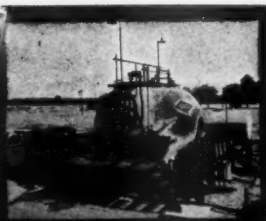
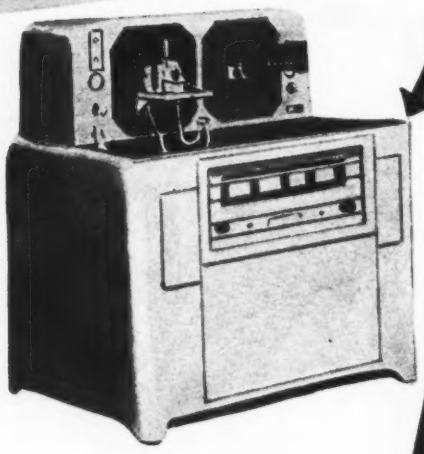
Long Beach, Cal., Casper, Wyo.: Dowell Affiliate—International Cementers, Inc.

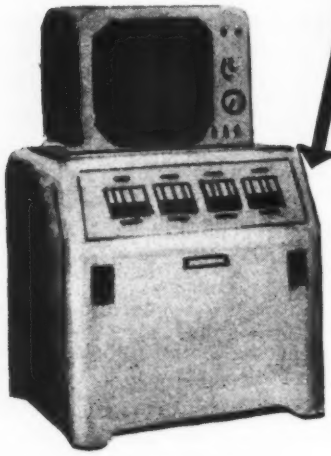
SPECIALISTS IN CHEMICAL CLEANING SERVICE



DOWELL

GOVERNMENT-OWNED SURPLUS
AMERICA'S BIGGEST POST-WAR ASSET





Modernize

PRODUCTION HARDENING

with Surplus

INDUCTION EQUIPMENT

If your production calls for the hardening, brazing, annealing or heating of metal parts here is the opportunity of a lifetime. A large quantity of Tocco induction heating equipment is available as surplus—for immediate disposal. The equipment is both used and unused and is price-tagged to sell quickly.

Here are the

SPECIFICATIONS

TOCCO EQUIPMENT

9600 cycles; 1, 2, or 3 Station 220/440 volt, 3-phase, 60 cycle, range 7½ to 125 KW; and 200 KW machines at 3000 cycles.

EXPORTERS

Most surplus property is available to the export market. Merchandise in short supply is withheld from export, and if such items appear in this advertisement they will be so identified by an asterisk.

Although this material has been previously offered to priority claimants, 10% of the merchandise has been reserved to fulfill any further needs of priority claimants including VETERANS OF WORLD WAR II who are invited to contact the Regional Office serving their area.

GET THE FACTS

To War Assets Administration: Without obligation, please send me information on the cost and location of Induction Heating Equipment of the following type.

_____

_____

Name_____ Tel. No._____

Firm_____

Address_____

City_____ State_____

WAR ASSETS ADMINISTRATION

GOVERNMENT OWNED SURPLUS

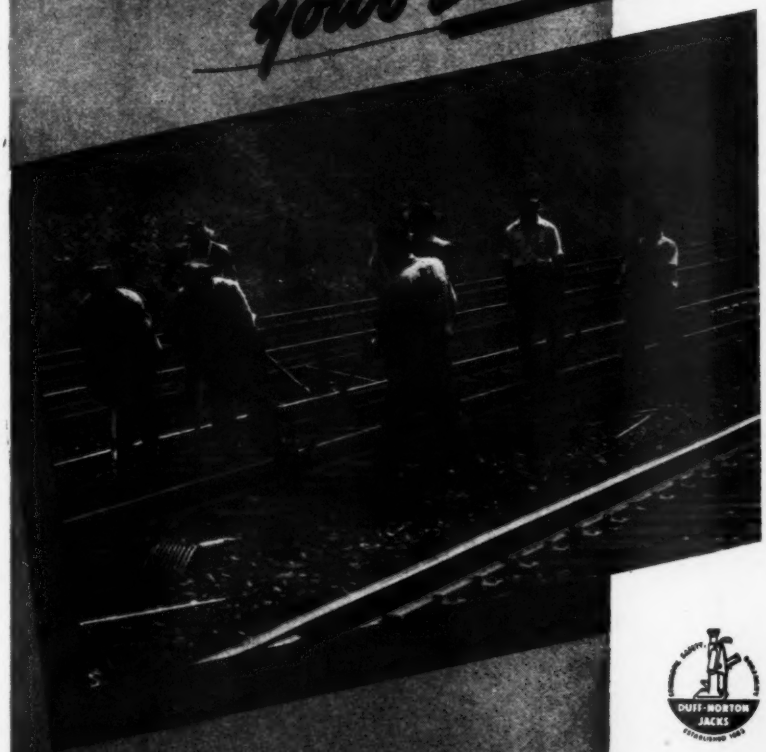
Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • Fort Worth • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles • Louisville • Minneapolis • Nashville • New Orleans • New York • Oklahoma City • Omaha • Philadelphia • Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane

700-1

DUFF NORTON
GENUINE BARRETT

TRACK JACKS
your Best Bet for

DEPENDABILITY
EASY OPERATION
LONG SERVICE LIFE

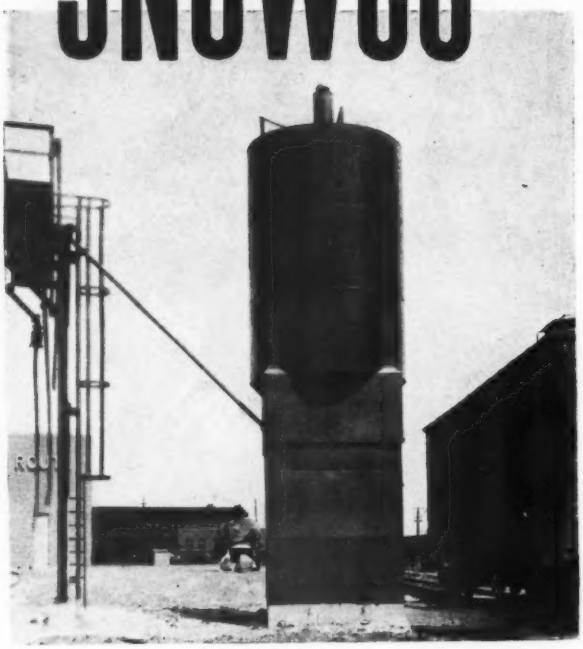


There is a safe, dependable Duff-Norton Track Jack for every job. The Single Acting Jack illustrated at right is ideal for *section gangs* since their work consists mainly of surfacing and lining, requiring only a low lift. The Double Acting Duff-Norton Track Jack is ideal for *extra gangs*—the load is raised on both the upward and downward strokes of the operating lever for high speed lifting. Write for the complete Duff-Norton Catalog.

Duff-Norton Genuine Barret Track Jack No. 117—Single Acting

THE DUFF-NORTON MANUFACTURING COMPANY
PITTSBURGH, PA.
There is a Distributor Near You!

SNOWCO

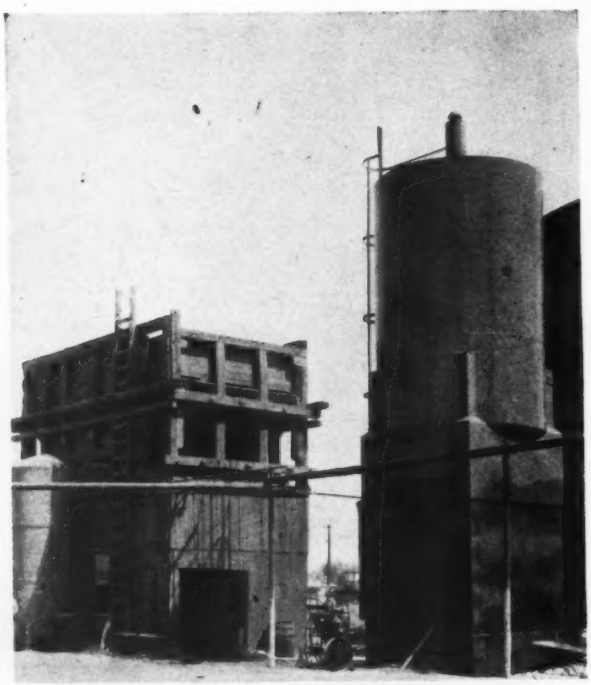


SNOWCO pre-dried sand storage unit for diesel power.

SAND STORAGE PROGRESS

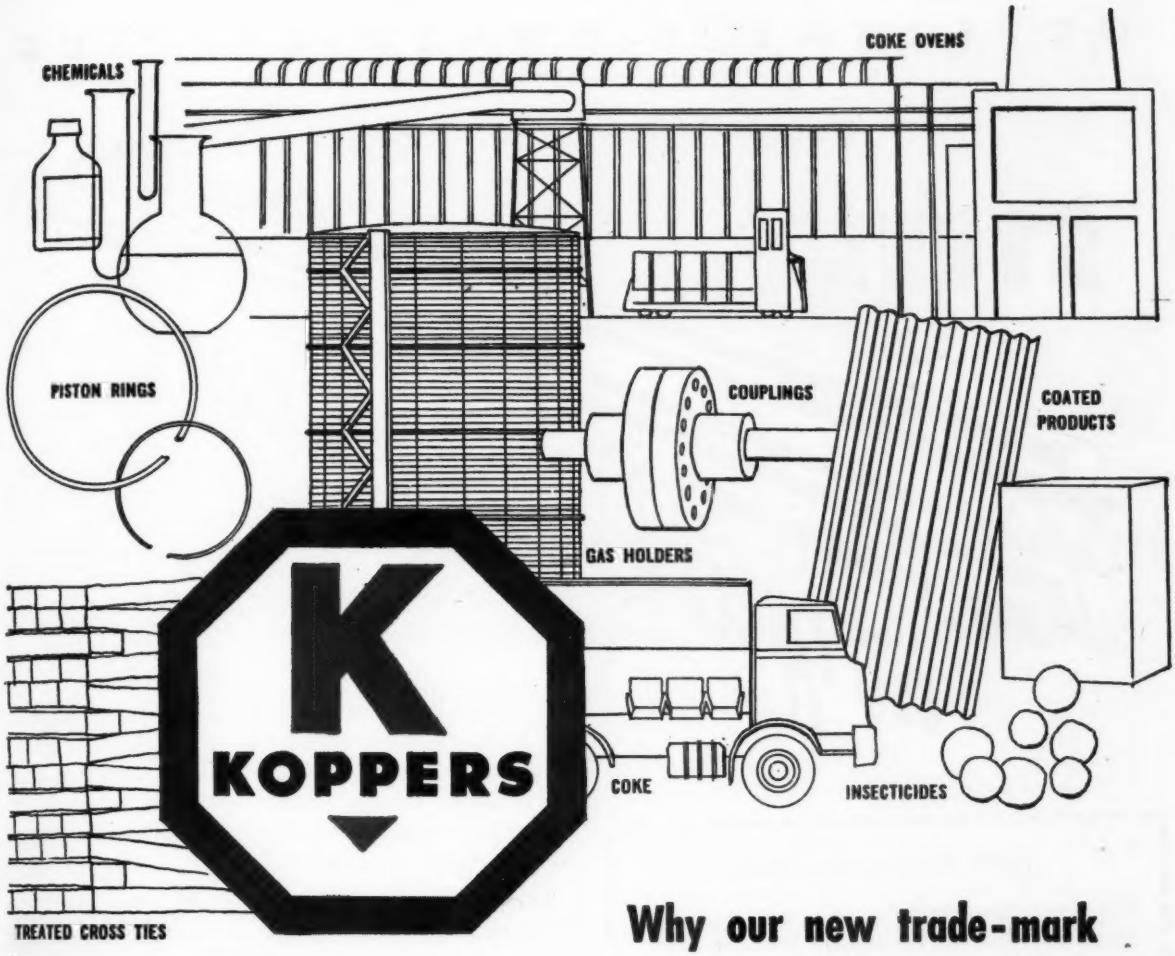
The SNOWCO central, pre-dried sand storage container (shown at left) for diesel power proved so successful that a second SNOWCO pre-dried sand storage unit (shown lower left) has been installed for steam power at the same terminal.

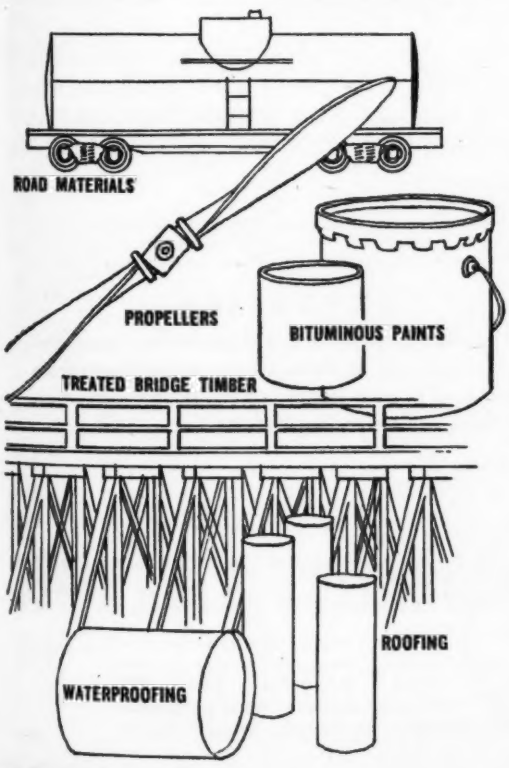
T. W. SNOW CONSTRUCTION CO.
9 S. CLINTON ST. CHICAGO 6, ILLINOIS



SNOWCO pre-dried sand storage unit for steam power. On the left is the old-style, unsightly sand drying device.

The only labor involved in filling SNOWCO sand storage units is removing the pre-dried sand from a box car with a wheel scoop and placing it into sand drum. The sand is rehandled without labor to service tanks.





Why our new trade-mark is important to you

Every day, you place your health, your safety, your children, even your life at the mercy of manufacturers whose products you trust.

Often you do it because of some small mark which doesn't actually say anything in words, but which says volumes in the meanings you read into it.

That's what trade-marks mean to the American people. In effect, the trade-mark says, "Here is a manufacturer who is so sure of this product that he puts his name on it."

That's why our new Koppers trade-mark is important to you.

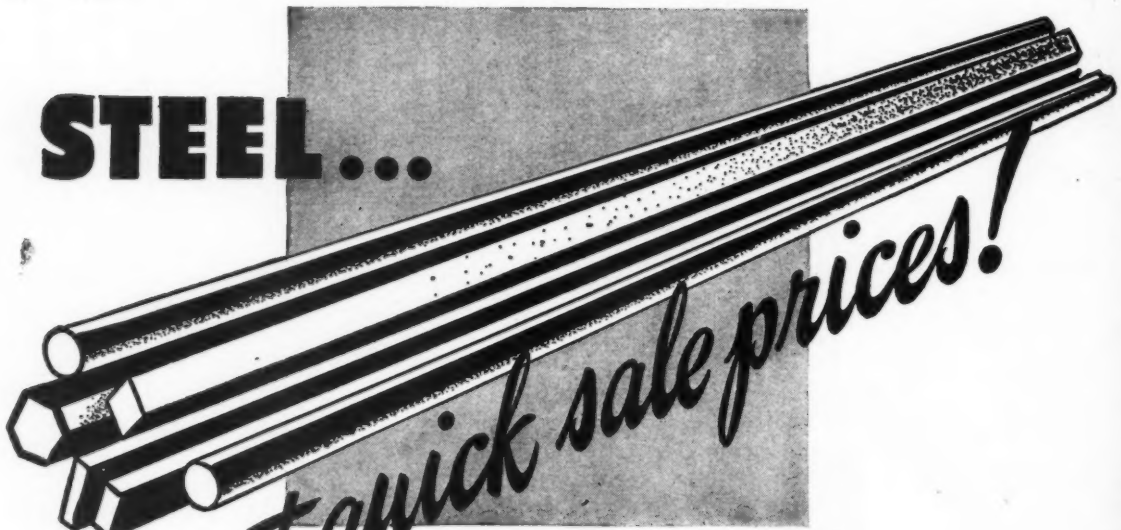
There are dozens of Koppers products; there will be dozens more as opportunities expand in the rapidly growing chemical field.

Often you will not be able to see the Koppers label on those products—you can't see it, for example, on road paving material or on a bottle of medicine—but the roadbuilder sees it and the medicine maker sees it, and their confidence in it is your safeguard.

Koppers also is well known as a dependable source for many other products and services which we furnish directly, such as the design and construction of coke ovens, roofing material, piston rings, couplings, propellers for your private plane, coke for your furnace, moth balls for your clothes, paints, pressure-treated wood and scores of others.—Koppers Company, Inc., Koppers Building, Pittsburgh 19, Pa.

KOPPERS—THE INDUSTRY THAT SERVES ALL INDUSTRY

GOVERNMENT-OWNED SURPLUS



STEEL... at quick sale prices!

STEEL can be bought now through War Assets Administration, for immediate shipment to you. Alloy steel billets, blooms and many items of alloy steel bars, particularly in the larger sizes, are available in Chicago, Cleveland, Detroit and other Regional Offices.

Lowscale prices make it worth your while to buy this high-grade material, even if you intend it for low-cost products.

Carbon and alloy steel mechanical tubing is also available in a wide range of sizes and specifications. Contact your nearest War Assets Administration Office below, or clip and mail the coupon.

FREE INFORMATION

To War Assets Administration:*

Please send me full information, including availability and pricing of the following:

Carbon and Alloy Billets and Blooms ☐—H. R. & C. R. Alloy Sheets ☐—Strip and Plates ☐—Stainless Steel Sheet and Strip ☐—Mechanical Tubing, Carbon and Alloy ☐—Standard Type Valves and Fittings ☐

NAME.....TEL. NO.....

FIRM.....

ADDRESS.....

CITY.....STATE.....

*Send coupon to nearest Regional Office below for fast service.

All steel is subject to priority regulations. VETERANS OF WORLD WAR II are invited to be certified at the War Assets Administration Certifying Office serving their area and then to purchase the material offered herein.

EXPORTERS

Most surplus property is available to the export market. Merchandise in short supply is withheld from export, and if such items appear in this advertisement they will be so identified by an asterisk.

WAR ASSETS ADMINISTRATION

GOVERNMENT OWNED SURPLUS

Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • Fort Worth • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles • Louisville • Minneapolis • Nashville • New Orleans • New York • Oklahoma City • Omaha • Philadelphia • Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane

4574

Red Lead NEUTRALIZES ACIDS *that Speed Up Rusting*

Every maintenance engineer knows that Red Lead has long been the outstanding protective paint for metal.

But did you know that one of the important reasons is the ability of Red Lead to counteract the acid conditions which are recognized as accelerators of rust?

Structural steel is usually exposed to acid environments. This is so because acid-forming compounds are produced by certain gasses and smoke in contact with moisture. Pollution of waterways also results in acidity.

Moreover linseed oil, synthetic resin varnishes and other commonly used paint vehicles *themselves* produce organic acids in the normal process of aging. Many of these also accelerate corrosion.

When Red Lead is the pigment in a protective paint, rust-causing acidity is kept under control. Actually, a "controlled" acid level is maintained in the paint film. This is a singular property of Red Lead and also contributes to the utmost in film flexibility impermeability and long life.

* * *

The value of Red Lead as a rust preventive is most fully realized in a paint where it is the only pigment used. However, its rust-resistant properties are so pronounced that it also improves any multiple pigment paint. No matter what price you pay, you'll get a better paint for surface protection of metal if it contains Red Lead.

* * *

Write for New Booklet—"*Red Lead in Corrosion Resistant Paints*" is an up-to-date, authoritative guide for those responsible for specifying and formulating paint for structural iron and steel. It describes in detail the scientific reasons why Red Lead gives superior protection. It also includes typical specification formulas. If you haven't received your copy, address nearest branch listed below.

* * *

The benefit of our extensive experience with metal protective paints for both underwater and atmospheric use is available through our technical staff.

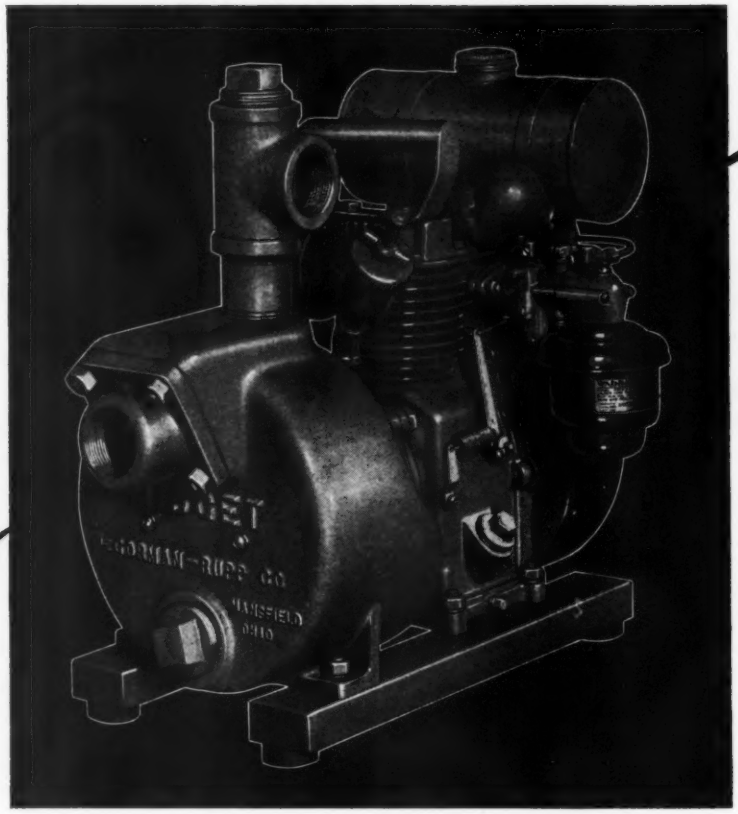
NATIONAL LEAD COMPANY: New York 6; Buffalo 3; Chicago 80; Cincinnati 3; Cleveland 13; St. Louis 1; San Francisco 10; Boston 6, (National Lead Co. of Mass.); Philadelphia 7, (John T. Lewis & Bros. Co.); Pittsburgh 30, (National Lead Co. of Pa.); Charleston 25, W. Va. (Evans Lead Division).

Dutch Boy Red Lead

PUMPS MORE WATER

per pound of pump

and at Less Cost of Operation



The Gorman-Rupp "Midget" pump will handle 3000 gallons per hour, 400 times its own weight in water every hour at average heads. It is easily carried from one job to another as it weighs only 60 pounds.

Not only will the "Midget" handle more water per pound of pump but will do it at less cost in power, fuel and maintenance. It is not uncommon for a Gorman-Rupp pump to run 60 days or more without interruption. It is the simplest centrifugal pump built -- rugged, reliable, efficient. It is automatic self-priming and non-clogging -- any muck or solids that will pass the intake strainer will clear the pump with no damage to the mechanism.

There is a size of Gorman-Rupp self-priming centrifugal pump to handle any pumping problem. Other models will handle capacities up to 125,000 gallons per hour.

Ask our nearest distributor for a Gorman-Rupp pump. Try it on the job. If it doesn't do a better job than any pump you have seen, return it at our expense.

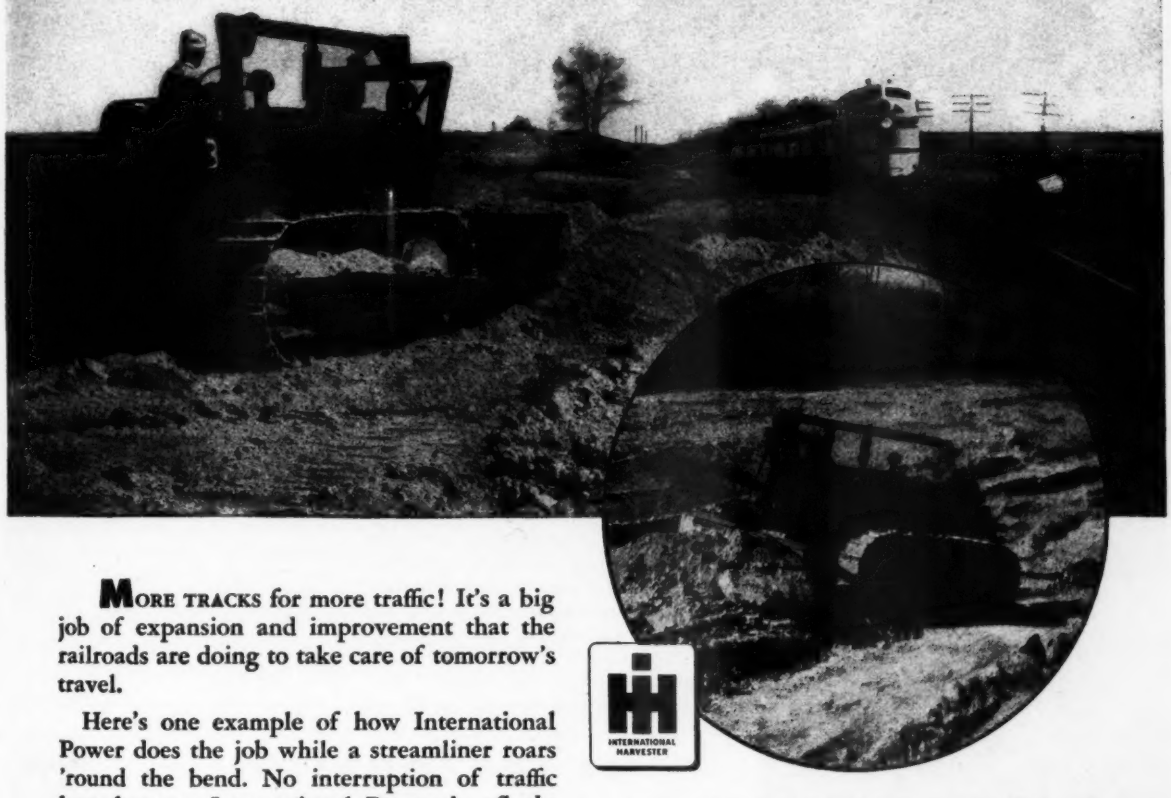
THE GORMAN-RUPP COMPANY

Gorman-Rupp Pumps — Unsurpassed for Pumping Fast

332 N. BOWMAN STREET • MANSFIELD, OHIO

INTERNATIONAL CRAWLERS

Blaze A New Trail



MORE TRACKS for more traffic! It's a big job of expansion and improvement that the railroads are doing to take care of tomorrow's travel.

Here's one example of how International Power does the job while a streamliner roars 'round the bend. No interruption of traffic here because International Power is *off the track,* out of the way of the trains.

These rugged TD-18 TracTracTors are moving thousands of yards of earth, preparing the roadbed for another track. It's hard work but International stamina comes through. "Down time" is reduced to a bare minimum. That means the job is done quickly and costs are cut to the bone.

International Industrial Power is designed to do a great variety of work for the railroads —along the line, in the shops and in the yards. Get the information you need about International Crawlers, Industrial Wheel Tractors and Diesel or gasoline Power Units from your International Industrial Power distributor. Let him help solve your power problems the efficient way—with International Power.

Industrial Power Division

INTERNATIONAL HARVESTER COMPANY

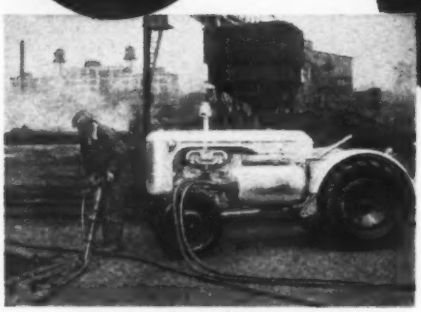
180 North Michigan Avenue Chicago 1, Illinois

INTERNATIONAL Industrial Power

LE ROI "TRACTAIR"

(BUILT BY THE MAKERS OF FAMOUS LE ROI ENGINES)

speeds right-of-way maintenance



"Tractair" mobility is ideal for station platform maintenance

"Tractair" makes short work of spike-driving and tie-tamping.

The Le Roi "Tractair" is a self-propelled, pneumatic-tired tractor-compressor that combines all of the features of an efficient, mobile 105 c.f.m air compressor with the flexibility and utility of a 35 h.p. wheel tractor. All pneumatic tools used in railroad maintenance that can be operated from a 105 ft. compressor can be handled efficiently by the "Tractair." The large pneumatic tires are equally as adaptable to adverse right-of-way conditions as they are to paved terminal facilities.

A complete line of interchangeable "front end" equipment such as loader, snow plow, rotary broom, back-fill blade, cargo and material lifts, crane arm, etc., as well as a mobile magnet pickup for cleaning scrap iron from right-of-way are now being developed.

For complete details and bulletins write to the Railroad Sales Dept.

LE ROI COMPANY
RAILROAD SALES DEPARTMENT
GEO. M. HOGAN — 327 South LaSalle Street, Chicago 4, Illinois

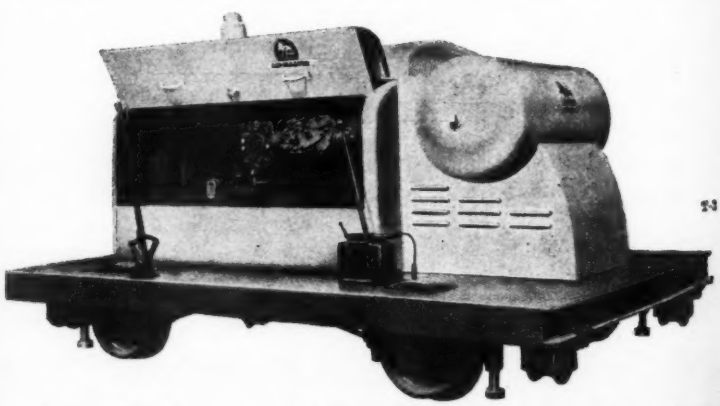
LE ROI MILWAUKEE

EXHIBITOR

BRIDGE & BUILDING TRACK SUPPLY ASSOCIATIONS

HOTEL STEVENS, CHICAGO
SEPT. 16 - 17 - 18 - 19, 1946

★ Come see us in Booths 4, 5, and 6 ★



Le Roi Rail Car Compressor furnished in self-propelled or non-self-propelled models. Sizes 105, 160, 210 and 315 c.f.m. with gasoline or Diesel power. Chilled wheels, hydraulic jacks, and electric starting are standard equipment

Your rail joint maintenance problem is simple when you use RMC Rail Joint Packing, for it is as permanent as the joint itself. RMC Packing has been used successfully on most of the major roads to reduce joint freezing caused by corrosion.

EXHIBITOR
BRIDGE & BUILDING
TRACK SUPPLY
HOTEL STEVENS, CHICAGO
SEPT. 16-17-18-19, 1946

R M C

RAILWAY MAINTENANCE CORP.
PITTSBURGH 30, PENNSYLVANIA

OWNERS OPERATORS

IMMEDIATE DELIVERY

ARC WELDERS...

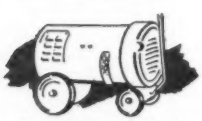
RELATED EQUIPMENT

New and used arc welders of well known makes, including Hobart, Lincoln and Westinghouse, in 200, 300 and 400 ampere ratings, either AC or DC, are now included in government-owned surplus and are available for immediate purchase and delivery.

Here you will find the equipment to modernize your shop—to replace worn-out or obsolete welders—to expand your business.

Lincoln—In all models and most ratings. Hundreds in the popular 300-400 Ampere size.

Hobart—Standard models of this make available in large quantities and most ratings.



Westinghouse — Portable models available in limited quantities.

Electrodes and Welding Rods — Millions of pounds available in all types and sizes.

EXPORTERS: Most surplus property is available to the export market. Merchandise in short supply is withheld from export, and if such items appear in this advertisement they will be so identified by an asterisk.

All arc welders are subject to priority regulations. VETERANS OF WORLD WAR II are invited to be certified at the War Assets Administration Certifying Office serving their area, and then to purchase the material offered herein.

Prices are low, based on the type and condition of the equipment. The inventory is located at various points throughout the country. It is broad and includes the machines you need. To obtain complete information on the availability, location and condition of the equipment you want **fill out the coupon and send it to your nearest War Assets Administration Regional Office.**

For full information clip and mail this coupon to:

War Assets Administration:
Please send me complete information on the availability, condition and location of the following types of equipment.

....Hobart Arc Welders	....Westinghouse Arc Welders
....Lincoln Arc Welders	...Electrodes and Welding Rods

Arc Welding Equipment: AC.... DC....
Electric Motor Driven: Volts....Phase....Cycles....
Transformer Type: Volts....Phase....Cycles....

Name.....

Firm.....

Address.....

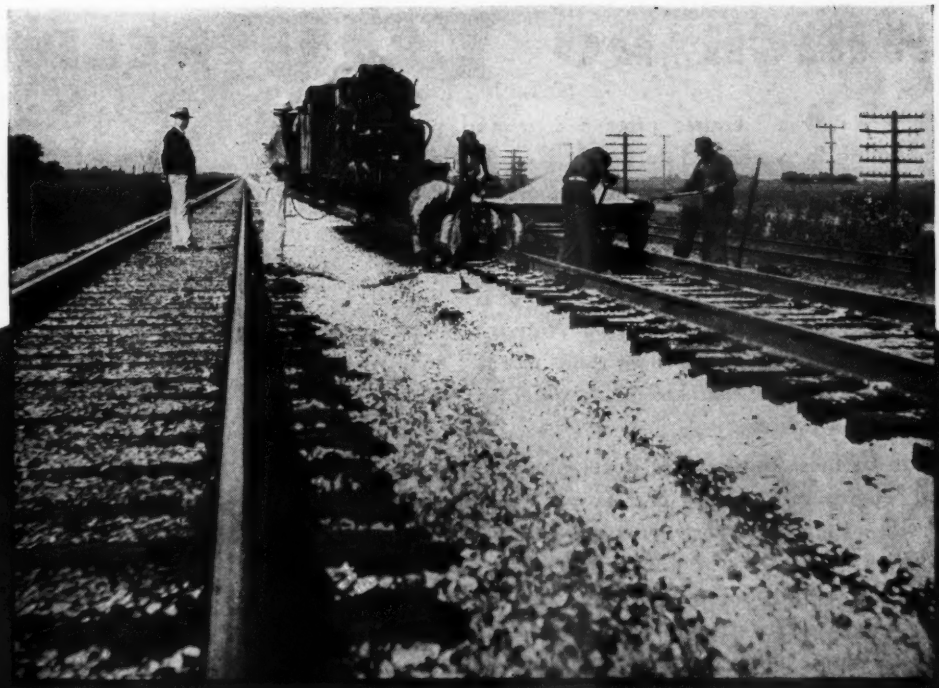
City.....State.....

WAR ASSETS ADMINISTRATION

GOVERNMENT OWNED SURPLUS

Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • Fort Worth • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles • Louisville • Minneapolis • Nashville • New Orleans • New York • Oklahoma City • Omaha • Philadelphia • Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane

645-1



Assuring Better Drainage Less Maintenance

THE workmen in the picture are installing stone ballast coated with *Texaco Asphalt* to seal out moisture and dirt. By providing a waterproof sealcoat, *Texaco Asphalt* assures quick drainage and prevents cinders and dirt from fouling the ballast. Experience has proved that this type of ballast will keep the track in good line and surface indefinitely, and greatly reduce maintenance cost.

Texaco Asphalt as a ballast coating is inexpensive and easy to use. It remains flexible for years and does not crack under traffic. It can be tamped even after long service. Maintenance men find *Texaco Asphalt* especially valuable for ballasting track adjoining station platforms, at approaches to open floor bridges, under overhead structures, and similar locations where drainage is difficult.

For 40 years, *Texaco Asphalt* has been used in steadily increasing volume for the construction and maintenance of America's streets and highways. A similar steady increase in its use by American railroads is further evidence that *you can't buy a better asphalt!*

For details on how *Texaco Asphalt* can help you reduce track maintenance, call the nearest Railway Sales Division Office listed below, or write:

☆ ☆ ☆

The Texas Company, *Railway Sales Division,* 135 East 42nd Street, N. Y. 17, N.Y.

NEW YORK ★ CHICAGO ★ SAN FRANCISCO ★ ST. PAUL ★ ST. LOUIS ★ ATLANTA

TEXACO

TEXACO Asphalt for Coating Ballast

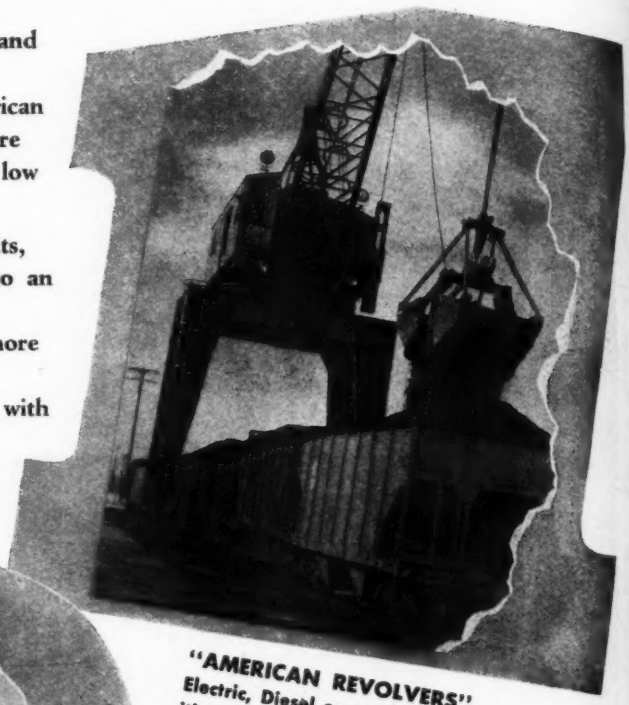
TUNE IN THE TEXACO STAR THEATRE WITH JAMES MELTON EVERY SUNDAY NIGHT—CBS

WHICH DO YOU NEED?

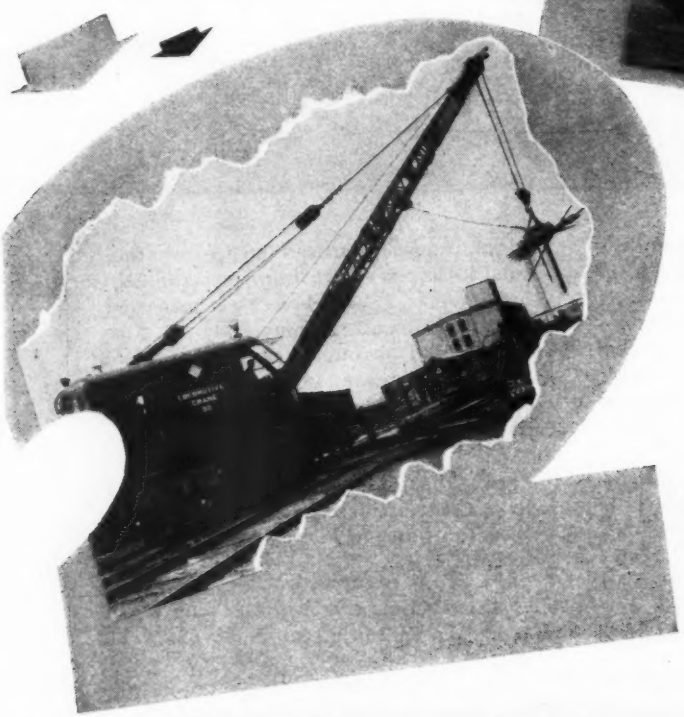
• "American Revolver" cranes offer a new and practical application to materials handling for yards and docks. It is an efficient, flexible, low operating cost application that pays off the cost of the equipment—many times over.

"American" Locomotive Cranes also offer new and practical applications of higher performance efficiency, wherever they are used. And like "American Revolvers," "American" Locomotive Cranes more than pay for themselves in the efficient, flexible, low cost operation they deliver.

Offering both of these outstanding developments, "American" engineers have the best answers to an extremely wide range of requirements. So, whether you are concerned with the need for more handling capacity or the obsolescence of your present equipment, talk over your requirements with us now. Write, phone or telegraph for further information or an engineer's call.

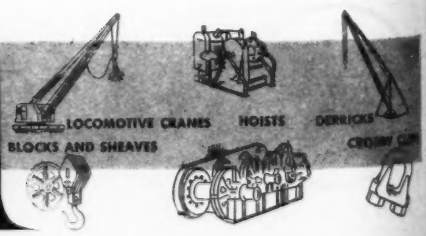


"AMERICAN REVOLVERS" Electric, Diesel or gasoline powered. Capacities, boom lengths, portal sections to suit your materials yard or dockside requirements. Machinery decks can be mounted as trolleys to extend service areas. Can also be equipped with car pullers.



"AMERICAN" LOCOMOTIVE CRANES Each type is engineered from the rails up to suit its particular power plant—Diesel, Diesel-electric and gasoline models are not mere adaptations of the original steam model. All have air controls and comfortable cabs that eliminate operator fatigue.

AMERICAN
HOIST & DERRICK CO.
St. Paul 1, Minnesota
CHICAGO · SAN FRANCISCO · NEW YORK



The

IMPROVED FAIR

THE P. & M. CO.

CHICAGO • NEW YORK • DENVER • CLEVELAND • ST. PAUL
WASHINGTON • ST. LOUIS • BOSTON • SAN FRANCISCO

9 TOURNAPULLS dig into 2½ million yd. Northern Pacific RELOCATION

▲ Heap loaded Tournapulls travel up 10 to 20% grade out of channel cut.

▲ Excavated material is spread on 60' fill.

▼ In hard digging . . . LeTourneau Rooter breaks up tough materials for faster loading.

ON 25-MILE STRETCH between New Salem and Glenn Ullin, N. D., the Northern Pacific Railroad is eliminating curves, reducing grades and cutting approximately 9 miles. Contractor A. Guthrie & Co., Inc., is using 9 Tournapulls on its 7-mile section of the job.

Channel change eliminates bridge

Guthrie's Tournapulls ran into tough digging and stiff grades in excavating channel change 35' deep and 2300' long to divert one stream into another and take both under a single bridge. Material is tough blue clay, hard, brittle, brick-like scoria and seams of coal, which are hauled out of the deep cut up 10 to 20% grades. Usable material is

Channel change 35' deep, 2300' long diverts one stream into another, eliminating bridge.

spread on the new right-of-way to build a 60' fill.

Round trips vary from 5,280 to 12,800'

On a 1-mile cycle each Tournapull averaged better than 6 trips an hour. This round-trip time included pulling loaded up 350' of 10 to 20% grade and traveling over a 1200' stretch of 7 to 8% adverse grade on return to the cut.

On another section of the job, Tournapulls maintained this high rate of production. Each rig delivered 3½ loads per hour on 12,800' cycles. Good job layout, well-maintained haul roads, plus the use of LeTourneau Rooters to speed loading in the tough materials, enabled Guthrie to take full advantage of the production capacity of his high-speed, rubber-tired Tournapulls.

For railroad construction, relocation and maintenance, Tournapulls give: (1) off-track operation for full-time production; (2) quick moves anytime, don't tie up track or train equipment; (3) move more dirt faster, at lower cost. Your LeTourneau Distributor can show you how Tournapulls are solving earthmoving problems for other leading railroads.

Tournapull, Rooter — Trade Mark Reg. U. S. Pat. Off. 11-11

Overall view of N. P. rail relocation which shortens line 9 miles between New Salem and Glenn Ullin, N. D.

LETOURNEAU
PEORIA, ILLINOIS

JOB-PROVED
Over 4500 Built and Shipped

TOURNAPULLS

FOR LOWEST NET COST PER YARD

PUMPING STATION IN THE WELL

BJ SUBMERSIBLE PUMP

The only basic improvement in deepwell turbine design...since Byron Jackson introduced the first deepwell turbine pump in 1901.

THE SUBMERSIBLE is a close-coupled deepwell turbine pump and electric motor—a complete pumping station. This motor-pump unit is suspended in the well by the discharge pipe...and operates *entirely submerged in water* at *any* well-depth. Thus the shaft alignment and bearing protection problems of shaft-type installations are entirely eliminated.

1000 FOOT SETTINGS are quite practical for the Submersible. This unique motor-pump unit operates equally well 50 feet down or 2000 feet down...because there are no shaft alignment or bearing protection problems. Many Submersibles are operating at depths from 900 to 1000 feet with amazing efficiency and unvarying dependability. *Motor sizes:* 10 to 350 h. p. *Capacities:* 50 to 20,000 gpm.

Byron Jackson Co.

LOS ANGELES 54, CALIFORNIA

Offices in Principal Cities

SUBMERSIBLE ADVANTAGES

Shaft-type Installations Cannot Equal These

- NO ADJUSTMENTS AFTER INSTALLATION
- YEARS OF AUTOMATIC, TROUBLE-FREE OPERATION
- NO WELL TOO DEEP
- ADAPTABLE TO CROOKED WELLS
- MAXIMUM EFFICIENCY
- NO PUMP HOUSE REQUIRED
- NO WATER CONTAMINATION SILENT OPERATION
- UNAFFECTED BY FLOODS OR ATMOSPHERIC CONDITIONS
- SAFE AGAINST VANDALISM

One-Man Operated

AIR CONTROLLED

ORTON

ONE MAN

AERO-CRANE

OPERATED, TRAVELED AND STEERED FROM THE CRANEMAN'S SEAT

- AUTO TRUCK MOBILITY
- ANTI-FRICTION BEARINGS
- AIR-OPERATED CLUTCHES
- SAFETY HOIST BRAKES
- BALANCED WEIGHT
- SIMPLE, POWERFUL DESIGN
- EIGHT MODELS

WITHOUT fatigue, and all day long, *one man*, with an Aero-Crane, does the work of 4 or 5 men—gets your material onto the stockpile and out again at minimum cost. With the Aero-Crane one man handles 200 to 1000 lb. loads that eat up the time of a yard crew.

Designed for rapid yard work, the Aero-Crane goes anywhere a truck can go. You can travel it light or loaded with boom in any position. Tough-built, with anti-friction bearings throughout, electric welded construction, non-burn clutches, Air-controls, Aero-Crane keeps going free of breakdowns—pays for itself in saved man-hours.

Built in a range of eight models. Capacities of 3,500 to 60,000 lbs. at 12 foot radius. Diesel or gasoline powered.

CATALOG 73 GIVES THE DETAILS. SEND FOR IT.

SENSITIZED

POWER

ORTON CRANE & SHOVEL CO.

608 S. DEARBORN ST., CHICAGO 5, ILL.

No. 213 of a Series

Railway
Engineering and Maintenance
SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO, ILL.

Subject: It's a Pleasure to Make the Effort

September 1, 1946

Dear Readers:

We have been both pleased and gratified during the last month with the favorable comment received, both written and oral, relative to the articles that appeared in our August issue, especially that entitled Small Station Has Radiant Heating and Other Innovations. We have been pleased because such comments assure us that we are rendering a valuable service to you, and we are gratified because it makes us feel more than satisfied with the extra effort made to bring you such articles.

And extra effort is often necessary to produce such articles. Take for example the passenger station story. In that case, and especially because the station described incorporates the first radiant heating system to be installed in a railway passenger station, we sought out detailed information concerning the project from the A. M. Byers Company, which promoted the idea successfully with the railroad involved.

When this information arrived, it was in the form of a relatively short general release, containing approximately 880 words—adequate for the general public, for which it was obviously intended, but clearly not adequate for men like many of you, who want the details of such projects. Accordingly, we started to search out additional information from every likely source, soliciting answers to a long questionnaire in one instance. Two long-distance telephone calls just five days before our closing date brought in last details, and the article was prepared, checked, set in type, and put on the press, with four highly descriptive illustrations. How much easier it would have been to have given you the bare release—but we're glad we didn't.

We know that such efforts to bring you the details, evidenced again in the Santa Fe ballast cleaner, Burlington turntable, and other articles in our September issue, are appreciated by you, and explain, in part at least, why most of you have confidence in our publication, and why our subscription renewal rate is among the highest of any of the trade publications in the country.

Sincerely,

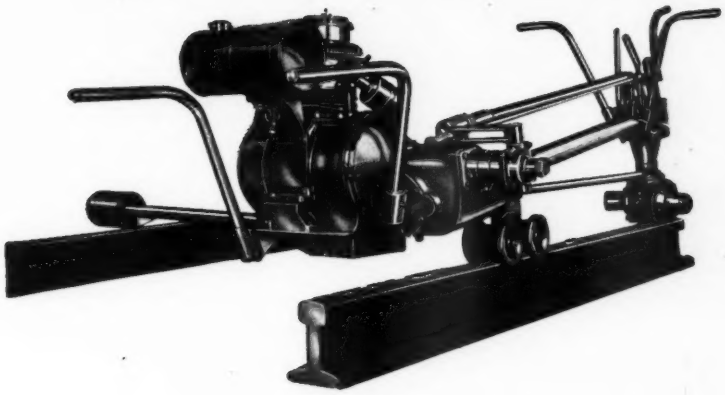
Neal D. Howard

NDH:jb

Editor

MEMBERS: AUDIT BUREAU OF CIRCULATIONS AND ASSOCIATED BUSINESS PAPERS, INC.

The new
Model B Raco Power Track Wrench



POWER

"Mr. ———— and Mr. ———— said there was no machine that would back off these rusted nuts. These nuts had been in service over ten years and up to date had required two men on a five foot wrench to break them loose. The Micro Cutout was set at 40 and with much grinding and squawking the nut was turned off. About every tenth nut required the use of the power lever."

VERSATILITY

The combinations of speed and power by proper use of the Micro Cutout, power lever, and engine speed make practically any desired results obtainable.

SPEED

"We ran up the new bolts in high, finishing in low. The Micro was set at 28 and the chucks turned from ½ to 2 turns in low after the Micro had released in high.
All men thought the machine very fast, no matter how it was used, and agreed it had plenty of reserve power."

Other Raco Machines:

Model A Raco Power Track Wrench
Raco Power Tie Borer
Everett Power M-W Drill

RAILROAD ACCESSORIES CORPORATION
CHRYSLER BUILDING • NEW YORK

Fairmont

THE

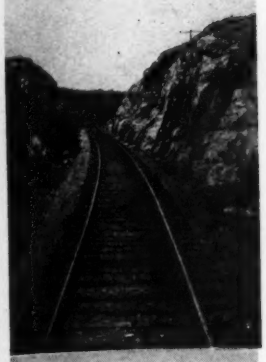
ORIGINAL DEMOUNTABLE WHEEL

The original demountable wheel was developed by Fairmont over 16 years ago. Since then it has had a steady increase in sales with the result that today Fairmont demountable wheels are recognized as the best.

Extra quality and long service are built into each and every one of these wheels with characteristic Fairmont thoroughness and precision.

Their economy and dependability have been proven and are being maintained at the same high level. Your needs for motor car, push car, and trailer wheels can best be filled by Fairmont, the original demountable wheel.

FAIRMONT RAILWAY MOTORS, INC., FAIRMONT, MINN.



Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

September, 1946

Published on the first day of each month by the

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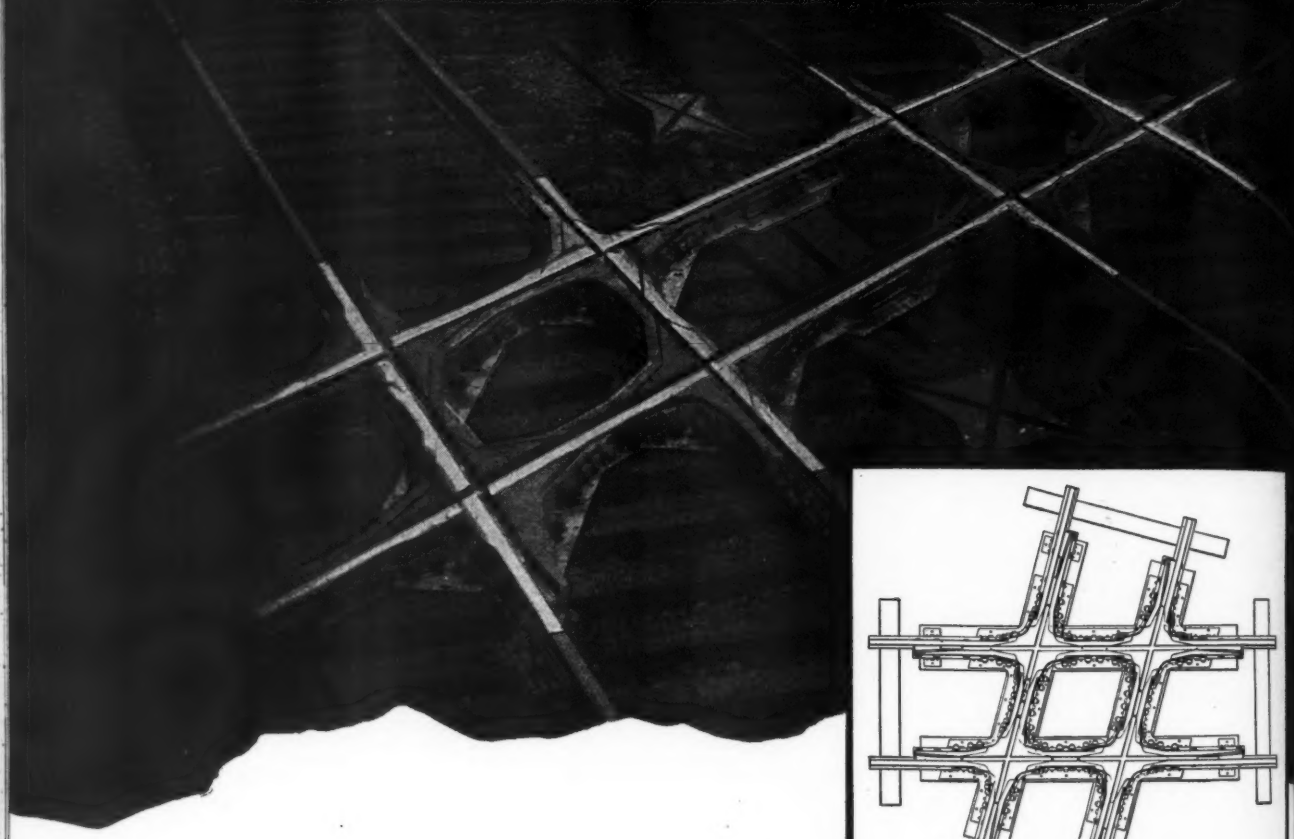

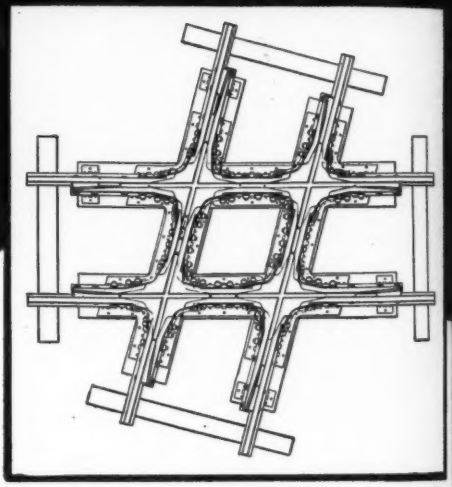

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Railway Engineering and Maintenance

Freight Rates—

Must Be Increased to Offset Enlarged Costs

Caught in a whirl of rising prices, higher wages, and declining traffic from war-time levels, the railways are seeking through the Interstate Commerce Commission a general increase of approximately 25 per cent in freight rates and charges, and permission to retain the existing 10 per cent increase in basic passenger fares, which, under present orders of the commission, will expire six months after the legal termination of the war. The outcome of these efforts will affect every employee on the railroads.

Applications in the above matters were filed before the commission on April 15 last, and hearings, started on May 6 in Washington, D.C., have been continued at various points about the country, including Chicago, Buffalo, N.Y., and Atlanta, Ga. In their briefs and supporting testimony, the roads have been presenting compelling evidence of their needs. Basically, they point out that, except for the temporary average freight rate increase of approximately 4.7 per cent in effect for a period of 14 months, from March 18, 1942, to May 15, 1943, a present temporary freight rate increase averaging 6.5 per cent, effective July 1, 1946, pending full hearings on the roads' petition for a 25 per cent increase, and the general 10 per cent increase in passenger fares authorized in 1942, they have been operating and continue to operate under pre-war rates; that the prices of the equipment, materials and supplies they must buy were 33 1/3 per cent higher in 1945 than in the immediate pre-war period, and have continued to increase, with still further increases in prospect; that the wage increases granted recently have raised the level of wages to about 48 per cent above the pre-war level; and that, as expected, the volume of railway traffic has declined sharply since V-J Day, with the prospect that this will continue for some time.

As to increased costs, it is estimated that wage increases since 1941 will make total railway wage payments for the calendar year 1946 approximately $1,355,000,000 more than would be paid if wages were on the pre-war basis, and that the cost of necessary materials and supplies in 1946 will be around $500,000,000 more than it would have been at 1939 prices. As to traffic volume, the roads are not too discouraged about 1946, their estimates being that freight traffic for the year will probably exceed by 23 per cent the 447,321,561,000 revenue ton-miles handled in 1929, the highest pre-war year, and that passenger traffic will be about 39 per cent greater than the 46,848,608,000 revenue passenger-miles in 1920, the largest in any pre-war year. But they cannot overlook the fact that the decline in freight and passenger traffic that has already occurred and is contemplated in 1946, compared with war-time peaks, will result in an estimated reduction of 23 per cent in operating revenues for the year, compared with those in 1945, with the further prospect that the volume of both freight and passenger traffic in the three years 1947 to 1949, inclusive, will probably be below that of 1946.

Testifying before the rate hearing in Chicago on July 22, one railway representative after another outlined the plight of their respective roads in the face of declining earnings and increasing costs, some predicting dire consequences unless adequate relief is forthcoming. All along the line there were indications that many roads are already in a period of forced retrenchment, and that others are faced with the necessity for taking drastic measures to reduce operating costs if adequate relief through increased freight rates is not forthcoming promptly.

Speaking for the Atlantic Coast Line, F. W. Brown, vice president-operations, told the commissioners that, as a result of increased expenses and declining revenues, the Coast Line, as of July 1, had reduced forces in the

car and locomotive departments by 2,563, and in the maintenance of way department by 1,100, and that on August 15, the work of certain contractors engaged in roadway rehabilitation would have to be terminated.

Roy B. White, president of the Baltimore & Ohio, testified that to hold the operating deficit of his road to a minimum, the B. & O. had made force reductions during the first six months of 1946 equivalent to 10,431 full-time positions, of which 7,672 were in maintenance. Howard S. Palmer, president and trustee of the New Haven, characterized the situation as "critical and alarming"; H. A. Scandrett, president of the Chicago, Milwaukee, St. Paul & Pacific, estimated that already on his road, maintenance work to the amount of $4 million had been deferred; and, speaking for the Illinois Central, Wayne A. Johnston, its president, said, "If the Illinois Central is now required to revert to the starvation diet of the thirties, the result will be to jeopardize not only its ability to maintain the kind of transportation service which this country now needs, but also to jeopardize the Illinois Central's ability to maintain itself in such a way that it can again respond to the needs of a great national emergency."

The implications in all of these comments are perfectly plain—the railways, while effecting all possible economies in operation and maintenance, and attracting all possible business to their lines, must be allowed an increase in their freight rates commensurate with the increases that have taken place in their operating costs.

Dirty Ballast—

Need for a Solution Growing More Urgent

FOR MANY years track men have conducted an unrelenting war against the problem of dirty ballast—a problem that has latterly taken on greater urgency than ever before because of the necessity for improving track conditions, increases in labor costs, and the increasing necessity for doing everything possible to reduce overall maintenance expenses. In this battle an imposing array of artillery has been amassed in the form of mechanized equipment for cleaning ballast, and to perform auxiliary operations, such as skeletonizing track to permit the crib ballast to be cleaned, of which equipment some units have only recently been developed.

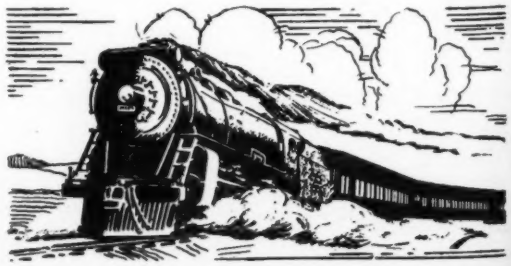
The ballast problem as it stands today has many different angles. Two of the most important of these are, (1) the importance attached to the desirability of cleaning the ballast in the cribs, and (2) the frequency with which ballast should be cleaned. Regarding the first of these, there are two general schools of thought. One holds that it is sufficient to clean the shoulder and intertrack ballast; that when this is done adequate outlet is afforded for water imprisoned in the cribs, and even that, with the voids open in the shoulder ballast, much of the foreign matter in the cribs is flushed out during rain storms. The other school is just as certain that the benefits sought when ballast is cleaned cannot be realized to anywhere near their fullest extent unless the ballast in the cribs is cleaned along with that in the shoulders of the track.

There is a question as to which of these schools is in the majority. No clue in this regard is contained in the fact that only a few railroads follow the practice of cleaning the crib ballast; there are no doubt many other railroads on which this policy is favored, but where it has not been put into effect because of the increased cost involved. However, a number of devices are now available for removing the crib ballast mechanically, and others are under development. Once removed to the shoulder, the ballast can be cleaned by any one of the several machines available for this purpose. What is needed now is a machine that will remove, clean and replace the ballast in the cribs in an integrated operation. When and if such a machine is developed it is safe to predict that the practice of cleaning the crib ballast will become much more common that at present.

Regarding the second angle of the ballast problem mentioned—the frequency with which ballast should be cleaned—the probabilities are that the differences of opinion that prevail today are more apparent than real. In other words, while there is considerable disparity on different roads in the intervals between ballast cleaning, there is little doubt that, as the cost of doing this work is reduced through the wider use of mechanized equipment, there will be a tendency toward greater uniformity in the frequency with which ballast is cleaned, probably accompanied by a trend toward shorter intervals between cleanings.

Whatever the reason, there are many miles of rock-ballasted track in this country in which the ballast is badly fouled or cemented. To some extent this situation can be attributed to the inability of the railroads during the war years to obtain the necessary man-power to carry out adequate ballast-cleaning or ballast-replacement programs. The time will come in the not too distant future when, in the interest of economical track maintenance, this situation will have to be corrected by either cleaning or replacing the foul ballast, after which it would seem that the most pruduent procedure would be for the roads to set their sights toward the establishment of a program designed to keep ballast in a clean free-draining condition. In some quarters the opinion prevails that this objective can be accomplished only by cleaning the ballast in both the cribs and the shoulders in accordance with a definite cycle.

The railroads are progressing gradually toward an eventual solution of the ballast problem. While this progress is being spurred by increased labor costs, many railroads have a considerable distance to go before it will be possible to say that a reasonably satisfactory solution has been reached.



Fabreeka Pads Absorb Shock from Locomotives Passing On and Off This 135-ft. Turntable at Galesburg, Ill.

Cushioning Shock at Ends of Turntables

The Burlington is experimenting with the the use of rubber fabric pads at the ends of its turntables and on the rim-bearing beams to absorb the impact shocks of locomotives when passing on and off the tables. It is anticipated that by this means the severe wear and batter occurring to the rail ends, end ties, end carrieges, and bearing plates from the hard service conditions at these points, will be considerably lessened and the service life of the tables extended.

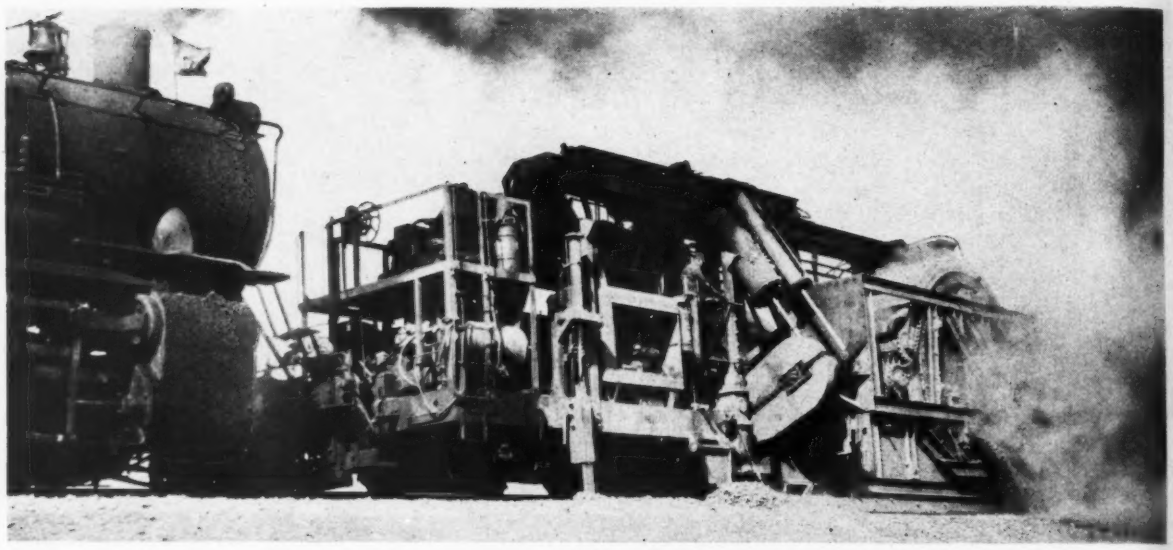
Impact Loads on Rails Over Circle Wall Are Cushioned by Fabreeka Pads Applied Between the Tie Plates and Steel Rim Beam

IN 1943 the Chicago, Burlington & Quincy began an experiment to find some practical and economical method of coping with the troublesome problem involved in maintaining the ends of turntables in good condition, a problem that is augmented by the inherent gap and difference in elevation between the ends of the rails on the turntables and those of the approach tracks. This difference in elevation, it was determined, can produce an impact load often amounting to two or three times the static load moving on and off the table, resulting in end batter to the rails and excessive wear and abuse of the end members of the table where steel parts are in contact.

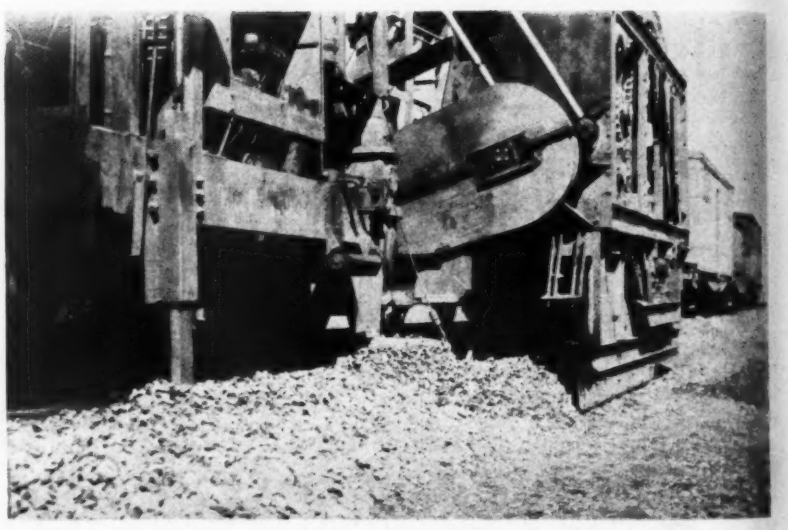
To absorb this impact shock, and thus alleviate this condition, the Burlington decided to experiment with the use of Fabreeka rubber fabric pads on the ends of several turntable decks, wherever the running rails were in direct contact with other steel members. The first application of these pads was made in 1943 on the turntable located at Ottumwa, Ia., at the time when the 85-ft. table at that point was being changed out with a 100-ft. through-truss table of three-point bearing design, converted from a balance type. The second such installation was made in 1944 on a similar table installed at Hannibal, Mo., while a third installation was made the same year on a 90-ft. through-truss table of the balance type located at East St. Louis, Mo. The fourth installation was made in 1945 on a 135-ft. deck-girder table of three-point bearing when it replaced the existing table at Galesburg, Ill. The fifth and most recent installation was completed in

(Continued on page 946)

Battles Dirty Ballast With New C



Above—The Ballast Cleaner in Operation. Note That It Is Drawn by a Locomotive Operating in Reverse



Close-Up View Showing (Left to Right) Scarifier Tooth, Ballast Plow and Wheel Frame

SOMETHING entirely new in ballast-cleaning machines has been developed and is now in successful operation on the Atchison, Topeka & Santa Fe. Incorporating a new principle of ballast-cleaner design, the machine is of the large on-track type and is designed to clean the shoulder ballast and that in the inter-track space in double-track territory. The machine was first placed in regular operation on August 1, 1945, and up to July 1, 1946, it had cleaned the ballast on 689 miles of track. In the future, with the cleaner fully perfected and operating in accordance with a definite program or cycle designed to prevent the ballast from becoming excessively foul, it is estimated that it will be capable of cleaning the ballast on about 1,250 miles of track annually, working throughout the year.

Giant Wheels Do the Work

The Santa Fe's ballast cleaner is mounted on a specially-designed car of heavy construction and is drawn by a locomotive when in operation, being pulled at a speed of 2 to 2.5 miles an hour, depending somewhat on the condition of the ballast. Briefly, the major operations involved in cleaning ballast are performed by and within two giant revolving wheels, one on each side of the car, which incorporate means for picking up the ballast, cleaning it, returning it to the track shoulder and wasting the dirt. The wheels are each mounted in a heavy structural-steel frame which in turn is mounted on the car in such a manner that it can be moved to and from the operating position and adjusted as necessary to accommodate the machine to changes in the ballast section. The two wheels are provided with separate drives and controls and are, therefore, entirely independent of each other.

The specially-designed car on which the ballast cleaner is mounted is 54 ft. 9 in. long over the end sills, 10 ft. 8 in. wide and 19 ft. 6 in. high, not including a hoist boom that is carried in a horizontal position on top of the unit. The car is of all-steel construction and is mounted on two four-wheel trucks. Above the underframe of the car the main structural members are in the form of a truss-like frame, with horizontal top chord and inclined end posts, which extends longitudinally along the center line of the car, providing the principal support, along

Cleaning Machine

For the last year the Atchison, Topeka & Santa Fe has had in regular operation a new-type ballast cleaner of its own design with which the road expects to clean the ballast in 1,250 miles of track yearly. The plan is to use the machine primarily to put ballast-cleaning on a two-year cycle on the company's Western Lines where rapid fouling takes place because of wind-borne material. The design and construction of the machine, its method of operation and the performance to date are described in considerable detail in this article.

with the underframe, for the two frames carrying the ballast elevating and cleaning wheels. These are mounted on the sides of the car somewhat back of the center, leaving the forward end of the car available for the driving engines, the operator's platforms and other auxiliary features.

The features of the machine that are of principal interest are the construction and the methods of operation and control of the ballast wheels and their supporting frames. Each wheel frame is attached to the car by means of pantagraph arms so that, in being moved between the raised and lowered positions, the frame remains always in a vertical position. When the machine is moving to and from the job the wheel frames are folded back into the sides of the car; to place them in the operating position they are moved outward and downward as necessary. The movement of each wheel frame to and from the operating position is accomplished by two 19-in. air cylinders, one at each end, which are used in conjunction with two 8-in. hydraulic cylinders for holding and locking the wheel frames in any desired intermediate position.

Rear View of Wheel Frame Showing Baffle Plates and (Extreme Right) Tie Wiper Blade

Details of Wheels

Each of the ballast wheels and its supporting frame are comprised of and incorporate a combination of fixed and movable parts depending on the function performed. The principal moving part is the wheel itself which, with a diameter of 12.5 ft., is in reality a revolving rim, designed to pick up the ballast from the shoulder or the inter-track space and dump it over three banks of screening grizzlies located inside the rim in a fixed position. To accomplish this purpose each wheel consists of a series of steel buckets mounted between circular steel plates that form the side rims of the wheel, these plates being 36 in. apart. Each wheel is supported in its frame and rotates on a number of rollers fixed to the frame inside the wheel. The contact between the rollers and the moving wheel is provided by two steel tires fixed to the inner surface of the rim, one near each outer side plate.

When the ballast-cleaning machine is in operation the wheels rotate at a constant rate of 10.5 r.p.m., the direction of rotation being clockwise to a person standing beside the track with his left side toward the forward end. The buckets in the periphery of the wheel are so designed and positioned that the ballast picked up by them is dumped inside the wheel as they pass through the upper lefthand quadrant of rotation. As it leaves the buckets the ballast is thrown onto the three banks of grizzlies which are mounted inside the wheel in an inclined position descending toward the rear of the machine, the angle of the incline being 30 deg. with the horizontal.

In each bank of grizzlies there are a number of separate grizzlies (three in the upper bank and five each in the other two banks), with the lower end of each grizzly placed several inches above the upper end of the one below it. Each grizzly consists of a series ¼-in. by 1-in. by 21-in. steel bars, which are threaded on two long rods at their upper ends in such a manner that the spaces between adjoining bars are ¾ in. wide, this being the minimum size of crushed stone or slag ballast used on the Santa Fe. The bars comprising the grizzlies are each gorged to a thickness of ⅛ in. at the bottom edge to minimize the possibility of particles being wedged between them. By means of the rods at their upper ends the grizzlies are fastened rigidly to the wheel frame in such a manner as to permit them to be readily removed for cleaning and repairs. Since the grizzlies are fixel only at their upper ends, the lower ends of the bars are free of any fastening or support that might serve to obstruct the flow of ballast over them or the movement of waste material through them.

The design of the wheel and the rate of rotation are such that, as the ballast leaves the buckets, it is thrown against the grizzlies with considerable force, and since succeeding grizzlies in each bank are offset from each other by several inches the particles of ballast are subjected to successive jarring movements as they pass over the grizzlies. The agitation of the ballast thus produced is such as to effectively separate from the particles any dirt clinging to them. As the ballast particles leave the grizzlies their direction of movement is downward and toward the rear, where they pass out of the wheel through spaces between the buckets.

Mounted in the lower rear portion of each wheel frame is a series of baffle plates by means of which the cleaned ballast is kicked downward in

a lateral direction (toward the track) to the track shoulder. Other baffle plates suspended from the wheel frame at approximately the ends of the ties deflect downward ballast that otherwise would be deposited on the ties. Any ballast remaining on the ties is brushed off onto the shoulder by a wiper blade placed directly behind the ballast wheel and frame. This blade consists of a hinged plate so placed in a diagonal position that the ballast is wiped off the ties in a plowing motion. This plate is raised and lowered and otherwise positioned by means of an air cylinder located overhead on the deck of the car. By means of the several sets of baffle plates in the wheel frame and the wiper plate, the ballast is returned to its proper position and slope in the track shoulder and no further shaping is required.

The dirt and other foreign matter that is separated from the ballast as it moves over the grizzlies drops downward between the bars of these parts. Underneath each of the upper two banks of grizzlies there is a metal deflector plate, shaped to a peak along the longitudinal center line and containing metal fins placed diagonally on the top surface on both sides of the peak. Foreign matter coming through the grizzlies is deflected sideways by these plates and their fins and falls downward in the spaces between the grizzlies and the sides of the frame, which are four inches wide, and is thereby prevented from passing through the grizzlies below.

The dirt coming from the deflector plates underneath the two upper banks of grizzlies, and that falling directly through the lower bank, lands on an endless conveyor belt near the bottom of the wheel, by means of which it is thrown outward onto the right of way. This belt, which is made of five-ply canvas and rubber belting, is 42 in. wide. For use in double-track territory a conveyor extension, 14 ft. long, is carried on the machine, which is attached to the short conveyor in the ballast wheel on the inter-track side of the machine. The conveyor extension is handled and supported in position by means of the boom and hoist located on top of the machine, which is powered by a hydraulic pump.

How Ballast Is Picked Up

Directly beneath each ballast wheel is a transverse scoop or pick-up blade which is mounted between two longitudinal plates attached to the lower sides of the frame, these plates being 37½ in. apart. The pick-up blade is a heavy plate with its bottom edge on a slope of 1 to 9 downward away from the track, this being the standard subgrade slope on the Santa Fe. The ends of the lower edge of the blade are flush with the bottom edges of the side plates, and its face is slanted backward from the bottom edge at an agle of 12 deg. with the vertical so that, as the blade moves forward, the ballast piles up ahead of it between the side plates and is raised sufficiently so that it can be picked up by the elevator wheel. The design of the side plates and the pick-up blade is such that when the lower edge of the outer side plate barely clears the subgrade at the toe of the ballast shoulder the lower edge of the transverse pick-up blade is at the proper depth. When the wheel frame is in the operating position the inner side plate clears the ends of the ties by about 12 in.

When the machine is operating in single-track territory the lower parts of both wheel frames remain as described above. For operation in double-track territory it is necessary to make a slight adjustment in the pick-up blade on the inter-track side of the machine. This consists of attaching an extension member to the blade, of such dimensions that the cutting edge is lowered six inches, retaining the same transverse slope. The purpose of using the extension blade is to make it unnecessary for the outer side plate to be forced into the inter-track ballast in obtaining a cut of the desired depth. Also, whereas the regular pick-up blade is about 36 in. wide, the extension blade is only 27 in. in width and is fastened in place so that its inner end is even with the corresponding end of the regular blade. Thus, the overlap that occurs in the inter-track space when the machine is operated from both tracks is only about 3 in.

Scarifier and Plow

Ahead of the ballast wheel on each side of the car are provided two devices by means of which the ballast is loosened and shaped to prepare it for being picked up by the elevator wheel. The foremost of these is a heavy, vertical scarifier tooth placed just beyond the ends of the ties, which is raised and lowered within a heavy guide housing by means of an air cylinder overhead. The purpose of the scarifier tooth is to make a preliminary break in the ballast and to remove any foreign objects that might interfere with the operation of the ballast-cleaning mechanism. The scarifier tooth can be adjusted to permit it to cut to any desired depth.

Placed directly behind the scarifier tooth is the second device for preparing the ballast. This is a plow which, with its forward end operating in the path formed by the scarifier tooth, forces the ballast outward away from the ties into a windrow of the proper width to be encompassed by the bottom side plates of the wheel frame. This plow is of the swinging type, with the mounting consisting of a hinged bracket, with a longitudinal axis, fastened on the side of the car. A cable attached to the outer end of the plow blade and extending to an air-operated drum on the car is the agency by which the plow is raised and lowered. A stop, extending from the sideframe of the car, prevents the plow from moving closer to the track than the end of a 9-ft. tie which is the longest tie used on the Santa Fe.

Provision is made for additional scarification of the ballast, if needed, by one or more teeth placed at the forward end of the wheel frame between the side plates. The teeth at this location may be bolted in position in any one of five sockets which are evenly spaced in the width between the side plates.

Wheel Drives

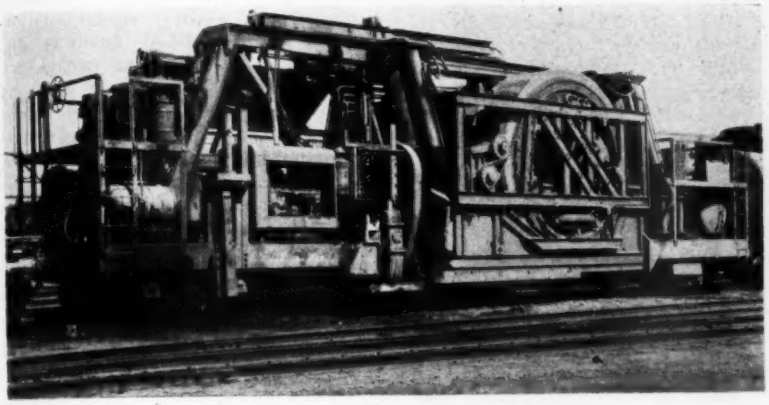
An important feature of the machine is the manner in which the two elevator wheels are driven. As already indicated each wheel is powered by a separate engine. These engines, which are mounted on the forward end of the car, one on each side, directly ahead of the respective ballast wheels, are both 135-hp. gasoline engines, operating at 1400 r.p.m. The power take-off from each engine is through a twin-disc clutch, a flexible coupling and a herringbone speed reducer. The shaft of the speed reducer is connected with the shaft of a miter box on the wheel frame by a roller-chain drive. The power is transmitted through the miter gears to two sprocket wheels, one on each side of the box. From these sprockets the elevator wheel is driven by two roller chains of the type used in drilling oil wells, one operating on each of the sprocket wheels and on a set of sprocket teeth extending around the side rim of the wheel. The proper tension in each chain is maintained by an idler wheel.

The rotation of each elevator wheel is used to furnish power for the operation of the conveyor belt inside the wheel for disposing of waste material. This is accomplished by means of a set of internal gear teeth mounted on the outer side plate of the wheel. A sprocket wheel operating on these gear teeth drives the conveyor belt through a miter box.

Controls

The operation and all movements of each elevator wheel and its frame are controlled from an operator's plat-

form situated directly ahead of the wheel in a slightly elevated position, where the operator has a clear view of the forward end of the frame and where his signals can be clearly seen by the crew of the pulling locomotive which is directly coupled to the machine and which operates in reverse. Included among the controls within convenient reach of each operator are a lever for operating the 19-in. air cylinders controlling the position of the wheel frame, a lever for controlling the 8-in. hydraulic cylinders by means of which the frame is held at any desired position, a lever for raising and lowering the forward scarifier tooth, and a lever for manipulating the swinging plow. When in the retracted position each wheel frame is held in place by a mechanical lock, and a lever for releasing this lock is also placed within convenient reach of the operator. Also, a foot lever is provided to actuate a plunger by means of which the wheel frame is pushed off balance when the mechanical lock has been released. A conductor's valve is also provided at each operator's platform in the event of an emergency in which the operator's signals are not seen by the locomotive engineer.



In this View of the Machine the Wheel Frame Shown Is in the Retracted Position

Other Features

Auxiliary features of the ballast cleaner include a gasoline-driven compressor of 160 cu. ft. capacity, located on the car directly ahead of the driving engines, a gasoline-driven arc-welding generator located on a platform immediately above the compressor, a pneumatic greasing system with a hose of sufficient length to reach to all parts of the machine requiring lubrication, a gasoline storage tank of 360 gal. capacity, located to the rear of the ballast wheels, and an oxy-acetylene cutting and welding outfit.

The arc-welding and oxy-acetylene welding and cutting outfits were included on the machine for use in making repairs. Many parts of this machine, particularly in and about the ballast elevator wheels and including the bottom side plates of the wheel frames, are subjected to a high rate of abrasive wear. At the time the machine was built it was not possible to obtain special abrasive-resistant steels for these parts, with the result that they had to be constructed of carbon steel.

Operating Personnel

The ballast cleaner and its crew are in direct charge of a track supervisor who devotes all his time to this work, living with the outfit. The crew for operating the ballast cleaner (exclusive of the train and engine crews) is composed of two operators and two assistant operators. Frequently several section laborers are included in the crew to remove foreign objects from the ballast ahead of the elevator wheels. Also, the outfit is accompanied at all times by a welder.

When the machine is in operation, the two operators remain at all times on the operators' platforms. The two assistant operators, who are fully qualified to act as operators if necessary, ordinarily walk along the right of way either beside or behind the machine to observe the operation of the elevator wheels, especially the height of the wheel frames, ready to signal any necessary adjustments to the operators. Another duty of the assistant operators is to raise and lower the ballast wipers behind the elevator wheels and to adjust them as to height for the different weights of rail that may be encountered.

When the ballast cleaner is in operation the work train in which it is incorporated is composed of five units, namely, the locomotive, the ballast cleaner, the tank car containing gasoline, the tool car and a caboose, arranged in the order named. The remaining cars of the outfit accompanying the ballast cleaner are set out on a conveniently located siding.

Two-Year Cycle Planned

The program that has been worked out on the Santa Fe for the operation of the ballast cleaner contemplates that it will be assigned to the Western Lines of the road for the major part of each year. Much of this territory is located in so-called dust-bowl country where ballast is fouled relatively rapidly by wind-borne dust and silt which is deposited primarily in the ballast shoulders. There are 1,950 miles of track in this territory that are ballasted with crushed stone or slag, and it is planned to go over all of this mileage with the ballast cleaner every two years, cleaning half of it, or 975 miles, in alternate years. It is estimated that the aggregate savings to be realized by this program through lower track maintenance costs generally will amount to many times the cost of cleaning.

It is expected that the machine will be used about nine months of the year on the Western Lines, and that during the winter months it will be assigned to the Coast Lines and the Gulf, Colorado & Santa Fe. During the three-month period the machine will be given a general overhauling, estimated to require about two weeks, while about another two weeks will be spent en route in commercial trains, leaving approximately two months available for actual work on the other territories.

During the first year of operation of the machine it has been necessary, in order to obtain ballast of the desired cleanliness, to make two passes over about one-quarter of the mileage covered, the territory requiring recleaning being nearly all in double-track territory, with one pass sufficing for the remainder. In the future, with the ballast being cleaned on a two-year cycle, it is expected that one pass will be sufficient in all cases. On this basis, and with the machine fully-developed and working an eight-hour day, it is estimated that an average of 5.5 miles of track will be cleaned daily, allowing for delays occasioned in clearing trains.

The Santa Fe's ballast cleaner was designed under the general supervision of G. W. Harris, chief engineer, by T. A. Blair, assistant chief engineer, assisted by John R. Rushmer, roadway engineer. The machine was built by the O. F. Jordan Company, East Chicago, Ind.

The Stevens Hotel Where the Concurrent Meetings Will Be Held Along with the Exhibit. All Sessions Will Convene on Third Floor With the Exhibit in Basement

Plans Se fo

THE STEVENS HOTEL, Chicago, on September 17-19, inclusive, will be the scene of a unique experiment in meetings of railway supervisory officers in charge of roadway and structures. During that period, and for the first time in their long and fruitful histories, the Roadmasters' and Maintenance of Way Association and the American Railway Bridge & Building Association will hold their annual conventions simultaneously in separate rooms under the same roof, with the program including a number of sessions of the combined groups. The complete program of the concurrent and joint sessions, all of which will be held on the third floor of the Stevens, is given below.

This new departure in the annual meetings of the two associations comes at a time when both groups, following the necessarily restricted activities of the war years, are resum-

Program

Concurrent Annual Conventions of the Roadmasters' and Maintenance of Way Association and the American Railway Bridge & Building Association

Hotel Stevens, Chicago, September 17-19, 1946

(All Sessions on Chicago Daylight Saving Time)

JOINT SESSIONS

TUESDAY, September 17

10:00 a.m.—Joint Conventions Called to Order.

10:15 a.m.—Greetings from the American Railway Engineering Association, J. B. Akers, Pres.

Greetings from the Track Supply Association.

Greetings from the Bridge & Building Supply Men's Association.

10:25 a.m.—Opening address by E. M. Hastings, ch. engr., Richmond, Fredericksburg & Potomac, Richmond, Va.

ROADMASTERS' SESSIONS

11:00 a.m.—Address by President H. E. Kirby.

11:20 a.m.—Report of Committee on Inspection of Rail by Track Forces, J. A. Stonebraker, Chairman (rdm., A.T. & S.F., Newton, Kans.).

BRIDGE & BUILDING SESSIONS

11:00 a.m.—Address by President N. D. Howard.

11:20 a.m.—Report of Committee on Adapting Turntables to Meet Modern Conditions, H. M Harlow, Chairman (asst. gen. sup. b. and b., C. & O., Richmond, Va.).

TUESDAY AFTERNOON

2:00 p.m.—Address on The "Boys" of Company A, by Major-General Carl R. Gray, Jr., vice-president, Chicago & North Western, Chicago.

2:40 p.m.—Awards of Honorary Memberships.

2:50 p.m.—Report of Committee on Tie Failures and Measures to Overcome Them, S. H. Shepley, Chairman (div. engr., E. J. & E., Gary, Ind.).

3:15 p.m.—Address on Reducing Maintenance of Way Costs, by F. R. Layng, ch. engr. B. & L. E., Greenville, Pa.

3:45 p.m.—Address on What Size and Design of Tie Plates, by G. M. Magee, res. engr., Engineering div., A.A.R., Chicago.

4:15 p.m.—Adjournment to Exhibit.

2:40 p.m.—Awards of Honorary Memberships.

2:50 p.m.—Report of Committee on Methods of Cleaning Water Lines, Sewers and Drains, W. D. Gibson, Chairman (asst. engr., C. B. & Q., Chicago).

3:15 p.m.—Report of Committee on Developments in the Use of Off-Track Work Equipment, F. R. Spofford, Chairman (asst. div. engr., B. & M., Dover, N. H.).

3:45 p.m.—Report of Committee on Methods of Improving Strength, Durability and Wear Resistance of Concrete, J. S. Hancock, Chairman (br. engr., D. T. & I., Dearborn, Mich.).

4:15 p.m.—Adjournment to Exhibit.

WEDNESDAY MORNING

September 18

9:30 a.m.—Report of Committee on Track Maintenance Problems in C.T.C. Territory, G. L. Morrison, Chairman (asst. engr. m. of w. and s., S. P., San Francisco, Cal.).

9:30 a.m.—Report of Committee on Tools and Equipment for Bridge and Building Shops, H. E. Davis, Chairman (supv. b. and b., N. Y. C., Chicago).

for First Concurrent Meetings of Roadmasters' and B. & B. Groups

ing full-scale three-day annual conventions. In preparation for the meetings, many pertinent subjects have been under investigation by technical committees of both associations, with their findings embodied in reports that will comprise the backbone of the business sessions. Interspersed with these on the programs of the separate meetings are a number of addresses on timely subjects of particular interest to the respective groups, while at other times those present will be brought together in a common meeting room to listen to addresses on subjects of mutual interest.

Adding further to the interest and value of the conventions will be a record exhibit of materials, devices and equipment used in the maintenance and construction of railway tracks and structures, to be held simultaneously with the meetings, but beginning a day earlier. This exhibit, to be conducted jointly by the Track Supply Association and the Bridge & Building Supply Men's Association, will be held in the exhibit hall of the hotel. A list of the exhibiting companies is presented in the news columns of this issue. In arranging the convention programs provision has been made to allow ample time for those attending the meetings to visit the exhibit and examine the products on display.

An interesting, constructive and eventful three-day period is in store for those attending the meetings. For this reason it is expected by those who have been closely identified with the work of planning the conventions that the attendance will be large—possibly reaching record-breaking proportions.

Presiding over the sessions of the Roadmasters' Association will be H. E. Kirby, assistant engineer, Chesapeake & Ohio, and president of the association, while N. D. Howard, editor, *Railway Engineering and Maintenance*, and president of the Bridge and Building Association, will direct the sessions of that group.

WEDNESDAY MORNING (Contd.)

JOINT SESSIONS

10:00 a.m.—Address on How the Chesapeake & Ohio Won the National Safety Council 1945 Award, by L. G. Bentley, gen. safety agent, Chesapeake & Ohio, Richmond, Va.

ROADMASTERS' SESSIONS

10:30 a.m.—Report of Committee on Means of Obtaining the Maximum Use of Maintenance of Way Powered Equipment, A. H. Whisler, Chairman (asst. engr., Pennsylvania, Philadelphia, Pa.).

11:00 a.m.—Address on Why and How of Ballast Cleaning, by H. W. Protzeller (consult. engr., Chicago).

BRIDGE AND BUILDING SESSIONS

10:30 a.m.—Report of Committee on Cause and Prevention of Personal Injuries to Bridge and Building Employees, H. D. Curie, Chairman, (mast. carp., B. & O., Garrett, Ind.).

11:00 a.m.—Address on Federal Interest and Responsibility in Railway Sanitation, by H. N. Old, San. Engr. Dir. in Chge of Land and Air Carrier Sec., San. Engr. Div., U. S. Public Health Service, Washington, D. C.

WEDNESDAY AFTERNOON

2:00 p.m.—Address on Problems Ahead in Railway Transportation, by Donald D. Conn, Exec. vice-pres., Trans. Assoc. of Amer., Chicago.

2:45 p.m.—Address on Reconversion and Recovery Problems on the English Railways, by W. K. Wallace, ch. civil engr., London, Midland & Scottish, London, England.

3:15 p.m.—Report of Committee on Minimizing the Need for Slow Orders, J. C. Jacobs, Chairman, (div. engr., I. C., Jackson, Tenn.).

3:45 p.m.—Address on Development in Roadbed Grouting, by T. A. Blair, asst. ch. engr., A. T. & S. F., Chicago.

3:15 p.m.—Address on Modern Architecture and Materials in Railway Building Construction and Maintenance, by J. C. Sherrick, partner, Holabird & Root, Architects, Chicago.

3:45 p.m.—Address on Preventing Bridge, Building and Tunnel Fires, by H. I. Benjamin, Vice-Chair., Sys. Com. on Ins., S. P., San Francisco, Calif.

WEDNESDAY EVENING

6:30 p.m.—Joint Annual Banquet of the Roadmasters' and Bridge & Building Associations.

THURSDAY MORNING

September 19

9:30 a.m.—Report of Committee on Selection and Maintenance of Ballast, H. W. Kellogg, Chairman (div. engr., P. M., Saginaw, Mich.).

10:00 a.m.—Address on The Assembled Installation of 27 Units of Special Trackwork, by T. H. Beebe, chf. drafts., C. & N. W., Chicago, accompanied by motion pictures.

10:45 a.m.—Business Session.

9:30 a.m.—Report of Committee on Utility and Economy of Pre-Fabricated Buildings, A. G. Dorland, Chairman (asst. engr., E. J. & E., Joliet, Ill.).

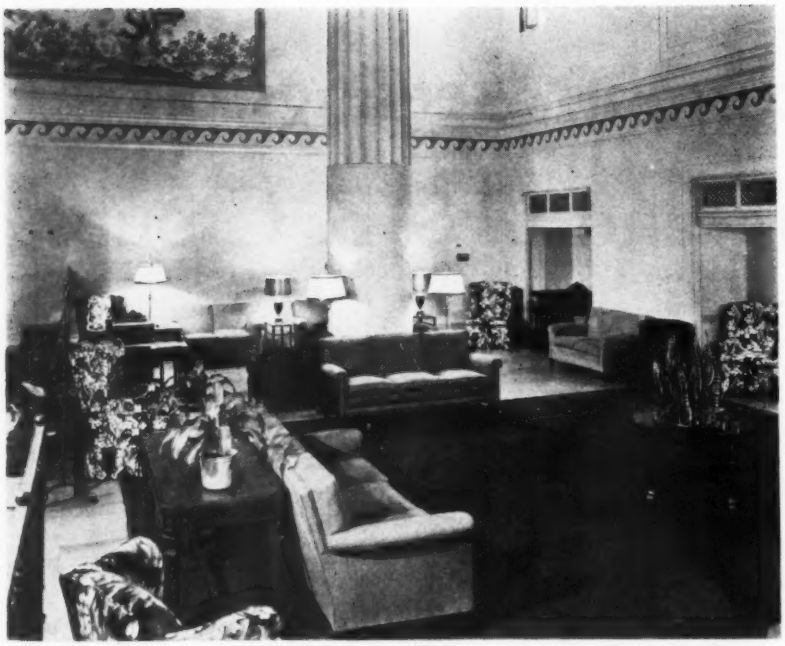
10:00 a.m.—Report of Committee on Servicing Facilities for Diesel Locomotives, B. R. Meyers, Chairman (asst. to ch. engr., C. & N. W., Chicago).

10:45 a.m.—Business Session

THURSDAY AFTERNOON

1:00 p.m.—Inspection trip to the Western Avenue Crossing of the C. & N. W. and the C. M. St. P. & P., where 27 units of special trackwork were replaced recently as assembled units.

1:00 p.m.—Inspection trip to the new modern Diesel maintenance and repair shop of the Burlington at Clyde (Chicago) Ill.



Comfort in Ultra-Modern Surroundings for Women Patrons Is Provided by the New Lounge in Chicago's Union Station

Lounge for Women Shows Careful Planning

WHAT are the possibilities for effecting changes in large passenger stations that will help to make railway service more attractive to women patrons? At the Chicago Union Station the answer to this question has been the provision of a luxurious lounge in the women's waiting room, which is decorated and furnished in a style found in few, if any other, railroad passenger stations, and in keeping with similar accommodations in only the finest clubs and hotels. The luxurious atmosphere was achieved largely through the aid of upholstered furniture, a large soft rug, colorful window draperies, floor-lamp lighting, a generally restful color scheme, and wall decoration which includes four large murals.

The women's facilities, located off the main general waiting room, are comprised of a large separate women's waiting room at main floor level; bath and toilet rooms, an infants' lounge for the special use of mothers with children, at basement level; and a hospital room, at the second floor level. Although these facilities are comprehensive in themselves, the management of the station decided that, owing to the large increase in the number of women travelers using the station, most of whom are accustomed to the conveniences and comforts of attractive homes, a comfortable lounge for women was desirable. Accordingly, a section of the women's waiting room was taken over for this purpose and an interior decorator was consulted to help plan the furnishings and decorative effect.

The new lounge is located at the west end of the women's waiting room, and occupies about two fifths of the total area of this room. In this location it can be reached conveniently and yet not form a part of the thoroughfare between the doorway from the main waiting room and the stairway to the basement facilities. The women's waiting room, 54 ft. wide by 73 ft. long, with a ceiling height of 40 ft., has always been spacious and airy. The floor is of Tennessee marble and the walls and ceiling are of plaster. Though the walls have been painted several times since the station was completed in 1925, they have always been finished with a flat buff color, with little ornamentation. Special decorative treatment was limited entirely to the ceiling, which is coffered, with a Pompeian-type of decoration in blues, yellows and dark reds.

The furniture in the room is American walnut, and the chairs and settees are upholstered in red silk mohair. Several ornamental iron partition grills were set along the south wall, in the line of sight through the door to the main waiting room, to afford seclusion from the gaze of passers-by. These are now arranged along the line of demarcation between the women's waiting room and the new lounge area.

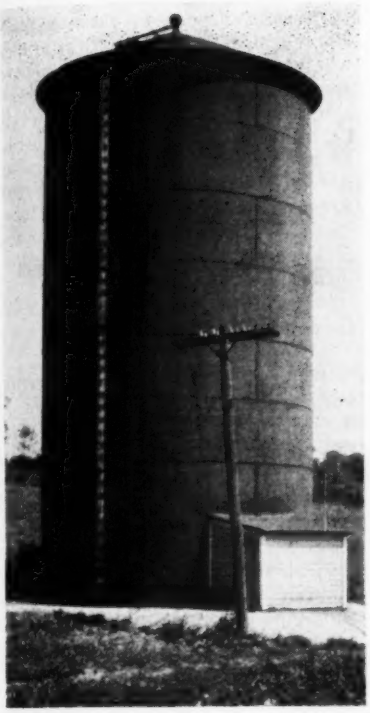
Decorative Treatment

The color motif selected is Burgundy red on a grey background. Accordingly, the walls were painted a light French gray and, because it would spoil the decorative effect if only the walls within the lounge area were given this treatment, the entire wall areas in the women's waiting room were painted. Two large murals, 14 ft. high and 20 ft. long, employing 863 color variations in the "Phoenix Bird" pattern, an English paper importation, were placed on each of the side walls.

The furnishings chosen for the new lounge are in harmony with the color scheme selected. They include pearl gray window draperies; a large dark gray and sand-colored rug with soft under-pad; five gray divans; four love seats in a lighter shade of gray; ten lounge chairs in Burgundy red; and seven wing chairs in red tapestry for winter use, which are provided with flower-patterned slip covers for summer use. Other furniture includes four double writing desks with pull-up chairs, and sufficient small tables and stand lamps to complete the decorative balance. Four niches left in the west wall by the removal of telephone booths, which were re-installed at the opposite end of the room, were fitted with two of the writing desks and two of the wing chairs, forming attractive offsets from the room proper. Large and small potted plants on the tables add further to the home atmosphere.

That the new facility is appreciated is attested by the fact that the Union Station management has received many complimentary letters from women in all parts of the country. Plans for the lounge were formulated and carried out under the direct supervision of the interior decorator, Ottlie B. Shiffer, LaGrange, Ill.

Cathodic Protection Stops Tank Corrosion



A Standpipe-Type of Tank of 101,000-Gal. Capacity at Strathmore, Va., in Which Cathodic Protection was Installed in 1940

During the last 6½ years the Chesapeake & Ohio has installed cathodic protection in 48 of its 148 steel water service tanks. With this method of electrical protection, no detrimental effects have been observed, interior corrosion below the water level has been stopped, and substantial savings are reported compared with the cost of repainting the interiors of the tanks below the water level. It is believed that the tanks so protected will have an indefinite life so long as the remaining surfaces—those exposed to the atmosphere—are kept adequately painted.

USING cathodic protection, a relatively recent development for the control of corrosion of the interiors of steel water tanks, the Chesapeake & Ohio has eliminated the problem of frequently repainting the interiors of these tanks below the high-water level. This method has stopped corrosion insofar as the interiors are concerned, thereby extending the life of these tanks indefinitely. At the same time, large economies are being realized through the use of this method, compared with the cost of cleaning and repainting the interior surfaces. Furthermore, at many locations, repainting has been impossible because the tanks could not be taken out of service for even a few hours, whereas interior repainting requires that they be drained and be out of service for 4 to 15 days.

The first installation of cathodic protection on the C. & O. was placed in service in March, 1939, in a steel water tank serving the passenger terminal at Phoebus, Va. This terminal had only one water tank and it was impossible to remove the tank from service long enough to clean and repaint its interior. For the same reason, other installations were added from time to time at points where the corrosive effects of the water were the most severe and where it became necessary that some form of protection be provided. Later, cathodic protection was installed at several terminals, each having two water tanks, but even at these locations it was undesirable to take one tank out of service for repainting because it would slow up water delivery at a time when traffic conditions did not permit any operating delays.

This means of protection has now proven its worth on the C. & O., and it is believed that additional installations can be amply justified on a cost basis alone, independent of the operating advantages involved. The railway now has 48 of its 148 steel water tanks equipped with cathodic protection, these tanks ranging in capacity from 50,000 to 690,000 gal. each.

Cathodic Protection

Cathodic protection utilizes the principle that underwater corrosion is an electro-chemical process, similar to the action of a primary electric cell, in which one metal or electrode dissolves and goes into solution. In the interior corrosion of steel water tanks, the shell of the tank serves as the anode, or positive pole, and the rust as the cathode, or negative pole. The electrolytic action causes the metal to dissolve in the form of ferrous hydroxide, and further oxidation produces ferric hydroxide, or rust. Pitted areas soon develop, covered by a wall of rust, and each of these, in effect, is a miniature electric cell.

The cathodic system of protection reverses this electro-chemical process by making the shell of the tank the cathode. Briefly, this is done by suspending a number of electrodes of suitable material inside the tank in the water, which serves as the electrolyte, and by connecting the electrodes and the shell of the tank to a suitable source of direct current, with the positive wire, or lead, connected to the electrodes, and the negative wire, or lead, connected to the steel tank. Connection to the tank shell is usually made at one point—at the bottom on the outside.

The direct current required in the application of this method of protection is secured from regular available sources of alternating current by using a transformer to reduce the voltage as required, and a dry-disc rectifier unit to change the power from alternating to direct current. The transformer used has a tapped secondary with switch connections, which permits the voltage to be varied according to requirements. Three types of dry-plate rectifiers have been used—magnesium-copper sulphide, selenium, and copper oxide.

In operation, electrolysis of the water takes place when the current flows through the water from the anode to the cathode. The dissociated hydrogen ions, which carry a positive charge, deposit upon the tank steel, which is in an electro-negative state, and lose their charge. This results in the depositing of an insulating film of hydrogen upon the shell interior below the water line. In addition, the nega-

tively-charged ions produced by the electrolysis of the water deposit upon the positively-charged electrodes, where they lose their charge, and where free oxygen is released, which reacts to oxidize the electrodes. Unless the electrodes are made of some chemically inert metal, such as platinum, they eventually become oxidized, and must be replaced at regular intervals.

The electrical control equipment employed with this method of protection, consisting of the transformer, rectifier, switches, a voltmeter and fuses, is usually housed in a steel cabinet, fitted with a hinged door. In some installations, at tanks where shelter is not available, the cabinets are of a moisture-proof type. In most locations, however, ordinary steel cabinets are used, located inside a nearby building.

Electrodes

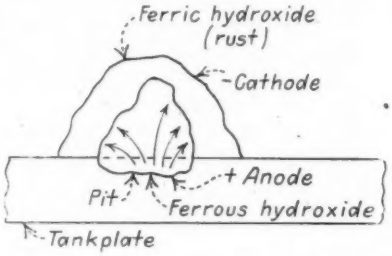
The number and size of the electrodes required depend primarily on the surface area under water to be protected and the electrical resistance of the water. The latter varies considerably and apparently has little direct relation to the pH value (hydrogen-ion concentration) of the water, but is closely related to the total amount of dissolved solids in the water and to the character of these solids from an ionization standpoint.

The location and spacing of the electrodes are also important factors, and the electrodes should be suspended at a sufficient depth to be immersed at all times. In some installations, only one electrode is necessary, while in others four or five have been used. In general, a single electrode is satisfactory only in tanks of small diameter. In larger tanks, four electrodes are usually used, one in each quadrant, located half way between the central axis of the tank and the shell. In one installation, a fifth electrode was added, located in the center of the downtake tube. The location of interior pipes or obstructions and the area of the additional surfaces to be protected must be taken into account in planning each installation and in locating the electrodes.

The Chesapeake & Ohio has tried a number of different materials as electrodes, such as wrought-iron, steel and copper pipe, carbon sticks, Positan electrodes (a platinum wire core encased in a flexible glass fabric), and a flexible glass fabric hose filled with granulated carbon. The pipe electrodes are usually 1 or 2 in. in diameter and 15 to 40 ft. long, depending upon the size of the tank. The Positan electrodes range from 72 in. to 160 in. in length, while some of the granulated carbon electrodes have been as long as 192 in. All electrodes, except the Positan, waste away in proportion to the current used, and must be replaced from time to time.

Current and Voltages

In operation, the voltages and amperages required for each installation vary considerably, depending upon the electrical resistance of the water, the number of electrodes and the area to be protected. The voltages range from 8 to 27, and the amperages from 0.5 to 6, with an average of approximately 10 volts and 3 amperes per 10,000 sq. ft. of surface to be protected.



A Drawing Illustrating the Electrolytic Action Which Causes Rust Cones and Pits

When cathodic protection in a tank is first started, the voltage is set higher than normal to establish a protective film as quickly as possible. Depending upon conditions, it may take from one to six months to build up full protection. After full protection is established, the voltage is dropped to normal so that the resulting current barely maintains protection. Conversely, if full protection is not being secured, and the system is in good order, the voltage is increased.

Rust Disappears

Since the first installation in 1939, the Chesapeake & Ohio has accumulated considerable experience with this type of protection and, in every case, observation has shown that soon after installation the old scale and rust begin to slough off gradually and the pits are seen to be clean. Later, the metal becomes uniformly coated with a gray deposit (in the case of the copper electrodes, this is a green deposit), although the protection is actually due to a microscopic film of hydrogen, rather than to the deposit.

In a number of instances, without lowering the water level in the tanks, the results of the protection have been checked by hanging two test specimens in the tanks, one of which was electrically connected to the tank shell by a wire, and the other suspended by a rope. In all instances, the wire-connected specimen has become covered with the characteristic gray coating, after which there was no evidence of corrosion, while the other specimen has become coated with rust in a short time, followed by pitting.

Periodic inspection of the cathodic equipment is necessary to determine whether it is functioning, to test switches and fuses, and to record voltage and ampere readings. On the C. & O., inspections are made at intervals of 15 to 30 days. The inspectors are provided with voltmeters and ammeters and the necessary plug connections for taking readings, for use at any installations not provided in themselves with this equipment.

Costs and Savings

The cost of the cathodic protection units installed depends primarily on the area to be protected. An installation in a 50,000-gal. elevated steel tank with an inside wetted area of approximately 1,800 sq. ft., which would require only one or two electrodes, costs approximately $385 to $395, plus the expense of the power line to the tank. An installation suitable for a standpipe-type treating tank, 40 ft. in diameter by 53 ft. high, with a downtake tube, containing a total of 13,600 sq. ft. of surface to be protected, would require five electrodes and would cost from $500 to $550. The cost of power for operating a cathodic protection unit ranges from 50 cents to $2 a month, depending upon the local power rate and the amount of current required.

On the basis of present-day labor costs, the cost of scraping and cleaning the interiors of steel tanks averages about 2.8 cents per square foot, the cost of applying the paint about 2.2 cents per square foot, and the cost of the paint for two coats 0.8 cents, making a total of 5.8 cents per square foot. Thus, the cost of painting the interior of a 50,000-gal. steel tank would be approximately $110, while the cost of painting a tank 40 ft. in diameter and 74 ft. high would be about $1,363. On this basis, in the case of larger tanks, the protection pays for itself within four years or sooner, depending on when a repainting job would normally be required, which is usually at least once in every four years. Installations in smaller tanks require a somewhat longer period to pay for themselves. These calculations do not take into account the fact that the service life of the tanks is increased indefinitely, or the operating advantages resulting from the fact that the tanks need not be taken out of service periodically for repainting.

No. 9 of a Series

This installment of the series on the care, selection and operation of track motor cars is the final section of a three-part article on ignition systems. Part III discusses principally the importance of good wiring, the various types of spark plugs and their care, and gives rules for maintaining the ignition systems of motor cars. The next installment, to appear in November, will deal with lubrication.

Getting a Spark in Motor Cars

Part III

By G. R. WESTCOTT
Assistant Engineer
Missouri Pacific Lines
St. Louis, Mo.

THERE are two features that are common to all spark-ignited motor car engines. These are the wiring and the spark plugs. Whatever the type of the engine or the source of the electric current may be, satisfactory operation cannot be expected unless the wiring is in good condition and the spark plugs are of suitable type and correctly adjusted.

Wiring

The primary wiring, often called the battery circuit, on a motor car engine comprises all the circuit up to the point where the potential of the current is raised from the initial 6 volts at the source to that required to produce a spark. The secondary or spark plug circuit includes all wiring carrying the current after its potential has been raised.

No. 16-gage wire, stranded for flexibility, is commonly used in both the primary and secondary circuits. The wire is made up of 19 strands of 29-gage tinned copper wire, suitably insulated. In the primary circuit the insulation required is only that necessary to prevent leakage of low-voltage current and the outside diameter is 5 mm. or less. Since the wire in the secondary circuit must carry a current of much higher potential, the insulation is much heavier, and an outside diameter of 7 mm. is common. In some cases, No. 14-gage wire, stranded 19 x 27 is used in the primary circuit, but it is generally considered that the greater strength of the larger wire is offset by the reduction in the degree of flexibility.

On a motor car, all wires are exposed to oil, moisture and weather. The insulation must, therefore, not only have the necessary dielectric strength but, in addition, should be well protected by an oil and water-resisting outer coating. This is often of braided rayon or cotton, heavily lacquered. The insulation and protection of the secondary wiring is especially important, both because of the high voltage it carries, and because it is subjected to much heat from the engine, and may often come into contact with metal parts to which the current tends to ground.

On a motor car, also, all wires are subjected to much vibration and should be inspected frequently. A wire may be broken within the insulation in such a way that the break may open or close, depending on the position or strain to which the wire is subjected. The insulation may become softened so that the current will leak through, or off at some point, permitting the shorting of the current. To prevent such damage to the insulation, all wires should be kept as free as possible from oil and grease; they should also be secured so that they will not rub on any part of the car, and, if possible, not come in contact with hot parts of the engine.

Wiring Repairs

When broken wires or worn places in the insulation are found, repairs may be made by splicing or taping as may be required; but such repairs should be considered temporary, and new wire applied promptly. Besides causing an unusual drain on the battery, wiring in poor condition is often responsible for much engine trouble. This may range from occasional missing to complete failure to fire. Hard starting, loss of power through irregular firing, and undue carbon deposits in the cylinder may often be due to poor wiring. So much depends on the wiring that the use of wire of a poor grade, or an attempt to continue wire in use after the insulation has become soft or worn, is very poor economy.

Terminals should be soldered to the ends of the wires and their contact surfaces kept clean and bright. Nuts on bindiing posts, except those on the spark coil, should be kept tight, using pliers or a small wrench. The spark coil binding posts are connected to small wires inside the box and if the binding posts are turned these small wires may be broken.

The wiring diagrams shown for dry cell battery ignition as used on single-cylinder, two-cycle engines, for magneto ignition on two-cylinder engines, and for storage battery and distributor ignition on four-cylinder, four-cycle engines, are typical. If a knife switch is used in a battery circuit, it is important that the switch blade is on the ground side rather than the battery side. While this makes no difference insofar as operation is concerned, it is desirable for the reason that if the switch is on the battery side, a short may result due to the blade becoming bent or otherwise making contact with some part of the engine or other ground. Even a drop of water under the blade will sometimes bring this about and result in a complete discharge of the battery while the car is

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standing. With magneto ignition, this is of no importance, since there is no flow of current unless the engine is running.

The Spark Plug

The spark plug is usually thought of as a small, relatively inexpensive part of the ignition system, the function of which is to produce a spark within the

Cut-Away View of a Modern Spark Plug

combustion chamber of the engine, thus igniting the fuel. As such, it is an important part of the ignition system; for however excellent the remainder of the system may be, poor ignition and poor engine performance may be expected if the spark plug is of incorrect type, or has become fouled or burned, or if the gap between the points is not set reasonably close to the proper width. Another function of equally great importance is that of carrying the high tension current through the cylinder wall. Since the engine is the natural ground for the current, this latter function is more difficult, although it is unfortunately one that is given less consideration.

The carrying of the current through the cylinder wall is accomplished by the inner part or core of the spark plug. This consists of an electrode or wire entirely surrounded, except at its two ends, by an insulator. The outer end of this wire terminates in a binding post to which the spark plug cable attaches. The inner end of the electrode is the center point of the plug and forms one side of the gap across which the spark is to occur.

The outer part or shell of the plug is of steel and is threaded at its base to screw into the cylinder head. The shell serves as a support or housing for the core and also has on its base the side electrode or point forming the ground side of the gap. Although the core and the shell may be separable, in the majority of modern plugs they are not, as the core is permanently retained within the shell by crimping the top of the latter tightly around the porcelain.

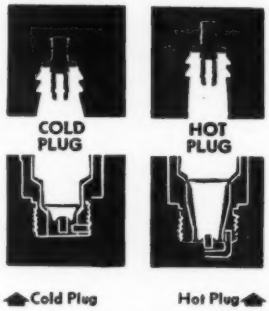
The contact of the base of the shell with the cylinder head is important as it must serve both as the electrical ground and as a means of carrying away the heat from the inner end of the plug. The points of the plug are at a hot spot in the engine and they are, therefore, subjected to much heat, the only escape for which is by conduction through the steel shell and the metal of the cylinder head. This suggests two things: (1) the plug must be screwed into the cylinder head tightly enough so that the path by which the heat escapes is continuous. Also, if the looseness is such that there is any blowing by of burning fuel, an unnatural source of heat is developed; (2) the plug selected must be of the proper heat range. A common saying is "a hot plug for a cold engine and a cold plug for a hot engine." The greater the distance from the points of the plug to the place where the porcelain is seated in the shell, the hotter will be the plug, as the flow of the heat is retarded by the distance it must travel. Contrariwise, if the length from the points to the contact of the porcelain with the shell is short, the plug is called cold, because the heat can be carried away rapidly.

The heat range of engines depends on several things. In general, water-cooled engines are cooler than air-cooled, and engines of low compression ratios are cooler than high-compression engines. The character of fuel, speed of rotation and amount of spark advance may also be involved. If the spark plug chosen is too hot for the engine in which it is used, burning of the points may result or over-heating may fracture the porcelain. Such a condition will shorten the life of the plug. In extreme cases, the points may become so hot that pre-ignition of the fuel charge may result, interfering seriously with the performance of the engine. On the other hand, if the plug is too cold, the points may become fouled by carbon deposits, and poor ignition result.

The relation of the heat range of the plug to the character of the engine is worthy of more study than it usually receives. It explains why the same plug may not be suitable for use in two different engines, each of which requires plugs having, for example, 18-mm. threads. While the recommendation of the engine manufacturer is the best guide as to the type of plug to be used, the maintainer should have a sufficient understanding of the heat range of spark plugs so that he can select a more suitable plug if the one furnished is not giving satisfactory service. Such a situation sometimes arose with one type of air-cooled engine where one of two cylinders was directly behind the other and, being less exposed to the air flow, ran much hotter. In that case, a colder plug in the rear cylinder gave better results.

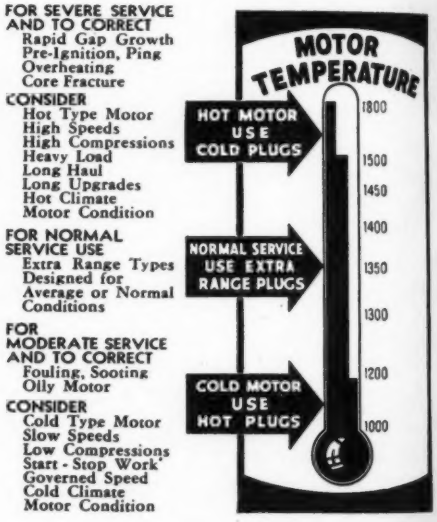
To get a suitable spark at the points

Illustrating Hot and Cold Plugs and Recommendations Regarding Their Use



COLD PLUG—Low insulator seat quickly carries heat from core and makes a cold plug.

HOT PLUG—High insulator seat allows core to retain maximum amount of heat making a hot plug.



of the spark plug, it is necessary that a current of suitable intensity is delivered at the points. To maintain this condition requires care. The current may be of sufficient intensity at its source, but if there is any route by which any part of it can escape to its ground its intensity at the gap will be diminished or fail entirely.

Such a route of escape may be found in the wiring of the secondary circuit or in the distributor, as has already been mentioned. It may also exist in or around the spark plug itself in various ways: the porcelain may be fouled by carbon deposits on the portion within the cylinder, or by accumulations of oil or grime on the portion outside; or the porcelain may be cracked and the current leak through the fracture from the center electrode to the shell. Such a crack may exist even though it may not be visible to the eye. The cleaning of carbon deposits from the porcelain inside the cylinder has become more difficult since the ½-in. pipe thread plug has largely given way to the 18-mm. or even smaller sizes. In the latter, there is scarcely room between the shell and the core for the "thin bladed knife" which has always been the maintainer's standby for cleaning plugs. To clean such plugs properly in the field is difficult, although in the shop, if compressed air is available, the removal of carbon by sand blasting is effective. In either hand or sand-blast cleaning, any marring of the glazing on the porcelain is to be avoided, as the porous interior of the procelain may absorb sufficient oil to short the current.

Cleaning Two-Piece Plugs

Where two-piece plugs are used, they may be taken apart for cleaning. If this is done, care must be taken to use properly-fitting wrenches to avoid damage to the porcelain, due to striking it in case the wrench slips. In reassembling, also, the copper gasket between the porcelain and the shell must be placed carefully and the gland nut pulled up tight, for any blow-by of burning gases through the plug will quickly result in a fractured porcelain due to the heat. With the slightly higher compression of many modern engines, it is difficult to reassemble a two-piece plug to prevent blow-by unless a new gasket is used.

The points of the plug must be kept clean and the gap between them set correctly. Here too, the recommendations of the engine manufacturer should be followed. The gap will generally be shorter with magneto ignition than with battery systems. While great accuracy is not required generally, it is important, on multiple-cylinder engines, that the gap be the same on all plugs; otherwise, unbalanced operation may result. On such engines, too, the use of the same make and type of plug in all cylinders is desirable for the same reason.

Setting the Gap

A feeler gage should be used in setting the gap; and only the side electrode should be bent. Any attempt to bend or move the center point is likely to loosen it or to crack the porcelain. This fact is generally known but often disregarded.

In screwing the spark plug into the cylinder head, a spark plug wrench, or an open end wrench of proper size, should be used, taking care that the wrench does not strike the porcelain. Pliers should not be used for this purpose. If a plug with tapered (pipe) thread is renewed when the engine is hot, it should be screwed in only moderately tight, and retightened after it has warmed up to the temperature of the engine; otherwise it may "sieze," due to the expansion, and there may be trouble in removing it later. If this should occur, apply a little penetrating oil, kerosene, or a mixture of gasoline and lubricating oil, permitting it to seep into the threads for a few minutes. The plug can then generally be removed without difficulty. Such trouble will not occur with plugs having straight threads and requiring gaskets. Although a good contact between the spark plug and the cylinder head is desirable, excessive wrench pressure in tightening it is not required.

With plugs having pipe threads, also, it is desirable sometimes to clean or "chase" the threads in the cylinder head with a pipe thread tap to remove any carbon or other incrustation that may prevent the plug from drawing down so that there is good contact between its shell and the cylinder head. This is not usually necessary with plugs having straight threads and gaskets; but with plugs of that type it is most important that the gasket be properly in place.

Rules—General

(1) Keep ignition system dry, so far as possible.

(2) Be sure battery or ignition switch is turned off when engine is not running.

(3) Retard spark for starting, if spark control is provided.

(4) After engine is started, advance spark as far as possible without causing loss of power or spark knock.

(5) Choose spark plug of correct heat range.

(6) Use a spark plug wrench or open end wrench of correct size to screw in spark plugs, pulling them down snugly but not too tightly if engine is cold. In that case, retighten when engine warms up. A loose plug will over heat quickly.

(7) Keep spark plugs clean; carbon deposits, oil or grime, either inside or outside the cylinder, will short the current, and cause spark failures.

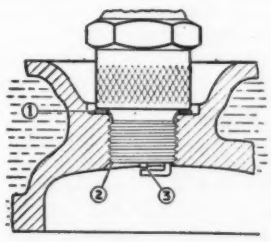
(8) If two-piece plugs are taken apart for cleaning, reassemble the parts carefully, being sure that the gasket under the porcelain shoulder is seated correctly and the packing gland is drawn down tight. Use wrenches of correct size.

(9) After cleaning, see that the gap between the points is correct. Follow engine manufacturer's instructions or set at 0.015 in. for magneto or distributor ignition or 0.030 in. for dry cell battery ignition. When adjusting gap, move outside point only.

(10) On a multiple-cylinder engine, be sure spark plug gaps are all the same.

(11) Avoid damaging the porcelain by striking it with wrench, or otherwise. A cracked porcelain will often cause a spark failure, even though the crack cannot be seen with the naked eye.

How One Manufacturer Illustrates Correct and Incorrect Methods of Installing Spark Plugs

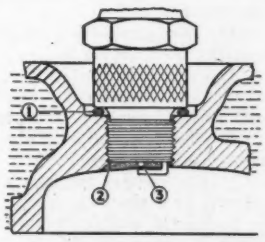


CORRECT INSTALLATION

Gaskets are firmly compressed, making proper seal between plug and cylinder head, eliminating chance for gas leakage and consequent overheating of plug.

No exposed threads provides proper contact of plug with cylinder threads, allowing no chance for a "hot spot".

Spark gap in proper location of cylinder, placing spark in exact location of gas stream, engineered for complete combustion.



INCORRECT INSTALLATION

1 Plug not tightened properly permits gas leakage past the threads and gaskets, preventing cooling from cylinder walls.

2 Exposed threads leave "hot spots" in the cylinder causing overheating and consequent pre-ignition.

3 Spark gap is pocketed taking it out of the proper position causing a delayed spark resulting in incomplete combustion.

(12) Do not use any method of cleaning that will damage the glazing on the porcelain.

(13) Avoid any blow-by of hot gases through or around the spark plug; the heat will quickly destroy the plug.

(14) If a spark plug with tapered thread is used, chase the threads in the cylinder head with a pipe thread tap and clean threads of plug with wire brush if necessary to secure a good fit between spark plug and cylinder head.

(15) In applying such a plug in a cold engine do not draw it down too tightly. Retighten when engine is hot.

(16) Watch for defective or improperly-applied condensers at timer or distributor. A poor condenser is certain to cause trouble.

(17) Keep wiring in good condition. Ignition failures are often caused by broken or partially broken wires, worn or softened insulation causing leakage of current, or poor connections.

(18) Keep insulation on wiring free as possible from grease and oil.

(19) Secure wiring so that the vibration of the car will not cause it to rub on any part, or flex repeatedly at any point.

(20) Keep wiring from contact with hot engine so far as possible.

(21) A defective wire may be repaired by splicing or taping, but such repair should be considered temporary and the wire renewed as soon as possible.

(22) Only insulated wire of the right size and kind for the purpose should be used in replacing or repairing the wiring system.

Two-Cycle Engines

(23) Store dry cells in a dry place away from extremes of heat or cold.

(24) Dry cells deteriorate in storage; keep only a small stock on hand, and use the oldest first.

(25) Store dry cells in a vertical position with binding posts up. See that no metal comes in contact with the binding posts.

(26) Do not use more than four dry cells in a battery, as more are wasteful and may injure the spark coil.

(27) Pack the dry cells firmly in the battery box, wire them in series, zinc (side binding post) to carbon (center binding post), and tighten the nuts on the binding posts with pliers. Do not carry tools in the battery box.

(28) Test used cells with an ammeter before discarding them. Do not discard cells testing 8 amperes or more for they will give additional service by adjusting the vibrator points properly.

(29) In testing dry cells with an ammeter, keep it in the circuit only long enough to secure a reading; the cell is in full discharge while the circuit is closed.

(30) Temperatures below 0 deg. F. will reduce the normal strength of dry cells about 5 amp. In freezing weather, try thawing the cells before deciding that they should be replaced.

(31) When new cells are installed, vibrator points, timer, wiring and connections should be checked and readjusted if necessary.

(32) With vibrator coil, adjust vibrator gap to 0.030 (1/32) in. and adjust vibrator spring tension so that current draw is 1.0 amp.

(33) If vibrator points become pitted do not file off the mound on one point; reversing the direction of the current at the battery will give better results.

(34) The secondary circuit must always be closed or have a gap of not over ¼ in. when the coil is buzzed; otherwise, the insulation within the coil may be punctured.

(35) Keep timer contacts adjusted, as recommended by the manufacturer. In the absence of such instructions, adjust so that the rim of the flywheel moves 5 in. while the timer is in contact. On a multiple-cylinder engine, maintain the same length of contact on all cylinders.

(36) Remember that with a plain coil, the spark occurs only at the end of the timer contact, not throughout the timer contact as with a vibrator coil.

(37) Adjust timer gap to .018 or .020 in.

(38) Only a short contact of timer points is required. A long contact wastes battery life.

(39) Be sure condenser on timer is in good condition and of proper capacity.

(40) See that timer points are clean and are in full contact when closed.

Four-Cycle Engines

(41) Keep magneto clean and dry and avoid tinkering with it. Oil sparingly and avoid getting oil on parts not requiring lubrication.

(42) Keep impulse coupling clean, so that parts move freely.

(43) Adjust magneto or distributor points, as called for by manufacturer's instructions, or set gap to 0.020 in.

(44) Be sure magneto is well grounded. Any insulating condition in the mounting of a rotary magneto may prevent its operating well.

(45) Keep top of wet cell (storage) battery clean. Use water only for cleaning. Do not permit gasoline or kerosene to come in contact with the battery.

(46) Keep connections on binding posts tight and clean. A little cup of grease on the connections will help prevent corrosion.

(47) The battery must be fastened firmly in place and kept reasonably level.

(48) The electrolyte should cover the plates at all times; exposure of the plates to the air will cause a deposit of sulphates to form on them and shorten the life of the battery.

(49) Wet cell batteries must be checked once a week, and, if necessary, distilled water added to bring the top of the fluid (electrolyte) about ⅜ in. above the top of the plates. Avoid overfilling.

(50) In cold weather add water to battery before, rather than after charging or using so that the water will be mixed with the electrolyte by chemical action and freezing will be avoided.

(51) When the battery is fully charged, the hydrometer reading should be 1.280. Avoid overcharging the battery. When hydrometer reading shows 1.225 or less, the battery is only one-half charged, and failure may be expected unless it is recharged.

(52) Do not add acid to the electrolyte without adjusting it to the proper strength; that is, to a hydrometer reading of 1.280 when fully charged.

(53) In cold weather the battery must be kept well charged to prevent damage by freezing.

Shock at Turntables

(Continued from page 931)

June of this year on a 100-ft. deck-girder table of the continuous, three-point-bearing design, located at Murray Yard, North Kansas City, Mo.* Hence, the pads are being tested on tables of various design under different operating conditions to determine their service life and other advantages.

In the various installations, the pads are used at the ends of the turntables and on the rim-bearing beams. Five or six steel ties are used by this road at the ends of its turntables to cope with the attendant severe impacts and general hard service conditions at these points and, at these locations, the rubber fabric pads are in strips, wide enough to provide full bearing for the rail, and long enough to cover all of the steel ties under each rail at each end. Hence, four such pads are required for each table, which are placed directly between the running rails and the steel end ties—no tie plates being used.

Over the outside half of the pit circle backwall, the approach track rails are supported on wood crossties fitted with thick tie plates, but directly at the inner face of the backwall the rails are supported on a continuous steel rim-bearing beam, the load being transmitted to the beam through steel plates resting on ½-in. Fabreeka pads. Hence, a pair of pads is required for each approach track. The pads, composed of layers of tightly twisted, closely woven, lightweight cotton duck, each of which has been impregnated with a synthetic rubber compound and vulcanized together to the required thickness, are all ½-in. thick, and are said to be oil and wear resistant, and to have lasting resilience.

The installation of the pads has been relatively simple, requiring no change in the regular erection procedure because the rails, in any event, are fastened to the steel ties and to the rim beam with clips and clip bolts. With the pads, the only change required has been the use of bolts ½ in. longer than would otherwise have been required. While the pads used on the Burlington's turntables have not been in service long enough to justify any definite conclusions as to their performance, their service to date has been quite satisfactory, with the definite assurance that, to some extent, they will prolong the service life of the turntables and their component parts.

*The installation of this table, in substitution for an old 80-ft through-truss balanced-type table, in June, was described in the August issue of *Railway Engineering and Maintenance*, page 838.

What's the ANSWER?

Which Way to Lay Rail

On multiple track, should rail be laid with or against traffic? Why? Does the diversion of traffic around the rail gang make any difference?

Makes Little Difference

By W. J. TURNER
Engineer Maintenance of Way, Atlantic Coast Line, Jacksonville, Fla.

There is little, if any, difference in the amount of work accomplished, whether the rail is laid with or against traffic, except with fully-mechanized gangs. If the rail is laid with traffic, the smaller items of equipment can be set off the track and the crane can be moved ahead to clear trains, thus affording more time before closure.

Trailing closures are safer, because the braking of trains as they approach the rail gang tends to bunch the new rail, as adequate anchorage is rarely provided at this stage of the work, in anticipation of immediate retimbering or tie spacing. Laying the rail against traffic provides some element of safety for the forces engaged on the work, in that closer observance is in the direction that the work is progressing. Furthermore, braking is done on the old rail, which is usually well anchored.

No set rule as to the direction in which the rail is to be laid can be adhered to, because the conditions under which rail must be laid vary so widely. Traffic over each segment scheduled for rail renewals should be studied carefully, and a program set up that will give maximum working time with the least number of closures, while causing minimum delay to regularly scheduled trains.

Diversion of traffic around a rail gang makes a great deal of difference in the amount of work that can be accomplished, because the work can be carried on continuously, without interruption, except for brief pauses during the passage of trains on the adjacent track. By all means, wherever possible, traffic should be diverted around rail-laying forces.

Disturbs Expansion Least

By W. WOOLSEY
Section Foreman, Illinois Central, Chicago

There is one paramount advantage in laying rail against traffic, this being that the expansion is least disturbed by the passage of trains while the work is under way. When trains are stopped on the newly laid rail, there is always some movement of the rail that affects the expansion allowance, because, as a rule, the joints are not fully tightened, some of the rail is not fully spiked, while there may be some delay in getting all of the anti-creepers applied to the rail.

Under these conditions, the braking applications necessary to bring the train to a stop or to reduce its speed to bring it into accord with the speed restrictions required by the slow order, affects the expansion allowance at many of the joints. The results of poorly distributed expansion allowance are far reaching; in fact, it becomes a never-ending source of annoyance. Too much expansion gap at joints will result rather quickly in battered rail ends, premature low joints and, in cold weather, unnecessary broken bolts.

In hot weather, if the expansion gaps are insufficient, the rail ends will be crowded together too closely, thus causing chipped rail ends. Furthermore, when necessary to loosen the ballast in the cribs or at the ends of the ties to surface or line the track, as the case may be, there is real danger that the track will buckle. Unless the expansion allowance is handled correctly when the rail is laid, it will seldom be cared for afterwards. This is one of the important tasks that a rail gang

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Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.

To Be Answered in November

1. *Are there any advantages in installing tie plates on ties at the treating plant? Why? Should this be done before or after treatment? How should they be fastened? Any disadvantages?*

2. *What can be done to minimize the breakage of glass in skylights?*

3. *Should guard rails protecting curves be bolted or clamped to the running rail? Why? What can be done to prevent the packing of the flangeway with snow and ice?*

4. *What methods can be employed for driving piles in frozen ground? What precautions should be taken?*

5. *Of what importance is uniform contraction of rail in cold weather? Why? If important, what measures can be taken to insure it?*

6. *What is the best way to reduce temporarily the volume of discharge of a centrifugal pump? Permanently? How does this affect the pump? Does the amount of the reduction make any difference?*

7. *Where troublesome water pockets occur in large yards, what methods can be employed to overcome the trouble?*

8. *What is efflorescence? How can it be prevented? How cured?*

should never overlook. Tightening the bolts fully, seeing that all spikes are in place and that anti-creepers have been applied are among the essential tasks. If done well they are hallmarks of good workmanship; if there is laxity with respect to any one or all of these, the rail will give unnecessary trouble during its entire service life, which, incidentally, is quite likely to be shortened appreciably. It has happened that section foremen have been blamed for allowing rail to deteriorate when the cause of the trouble for which they were criticized could easily be traced to lax supervision in the rail gang.

Where it is at all possible to divert traffic around the rail-laying operation this should be done, because it pays a handsome return. In the first place, the work progresses at a much higher rate than where it is necessary to make closures for trains and clear the track of equipment. Almost invariably the quality is better because the gang organization is not interrupted or the routine of the work broken as it must be when necessary to make closures for trains.

Cleaning Ballast by Hand

Under what conditions, if any, is it desirable to clean ballast by hand? To what extent can this be done? Does this include the cribs? What disposition should be made of the screened-out material?

Knows Of No Condition

By L. J. Drumeller
Engineer of Track, Chesapeake & Ohio, Richmond, Va.

I know of no condition under which it is desirable to clean ballast by hand, but there are conditions under which this method is necessary, regardless of its desirability. Typical of such situations are the margins of ballast-deck bridges, along station platforms and through crossovers between main-line tracks. In each of these cases the ballast in the cribs should be included in the cleaning operation.

Where track is being given a general raise not to exceed 3 in., and where the ballast is not too foul along the margin and in the cribs, it is sometimes the practice to tamp the raise with ballast forked up by hand from both the inter-track space and the margin. This is followed with a light dumping of ballast on the outside of both rails only, by means of side-dump cars or pans especially designed for this purpose.

Such a method does not require the spreading of new ballast, prior to the raise, across the entire track structure. It also eliminates the necessity of cutting jack holes and shoveling out the ballast between the rails, thus reducing the cost of redressing the ballast section. It has the advantage of having part of the inter-track space and margin ballast cleaned with forks. This is the only exception of which I know to the statement contained in the first paragraph, and it applies only to those places where the track is being surfaced with a light lift.

We now have machines for cleaning the inter-track space and margin, but so far I know of no device that will clean the ballast in the cribs successfully. For this reason, as well as because of the acute labor shortage during recent years, this cleaning, which was formerly done by hand, had to be curtailed or eliminated, with the result that ballast began to slop and churn long before the track was due normally for another surfacing.

To insure the best results from a general surfacing, the cribs must be cleaned, this being specially true on mountain grades where heavy sanding is customary and where front-end screenings abound. It is easy to foresee that in the future less of this type of work will be done by hand, because of increasing labor costs and declining income. Cleaning the cribs constitute the most expensive phase of putting up track, for which reason there is a definite, but as yet unfilled need for a machine, working off-track if possible, which will dig the ballast out of the cribs, screen it and return the cleaned ballast back in place between the ties.

Material screened from the ballast during the cleaning operation should, so far as it is practicable to do so, be taken to a fill for disposal and dumped well over the sides, if possible, to the foot of the embankment. It has been my experience that if the waste material from the screening operation is dumped just over the shoulder of the embankment, it will be held by the vegetation along the slope and begin to build up from that point to widen the shoulder. Over a period of years, if this waste continues, the slope will assume a steep angle of repose which will not be entirely stable. The result will be a weak roadbed shoulder, which will not be able to carry its part of the track load as the track is raised from time to time.

Only A Few Places

By G. S. Crites
Division Engineer, Baltimore & Ohio, Baltimore, Md.

It is desirable to clean ballast by hand only at places where ballast-cleaning machines cannot be employed. These places are relatively few in number, but include such situations as track fronting on station platforms, railway crossings, through turnouts and crossovers and in tunnels. At all of these locations the ballast to be cleaned includes that in the cribs; otherwise the dirt from the cribs will quickly foul the cleaned ballast on the shoulders or in the inter-track space.

In the cases cited, hand cleaning is best accomplished by working from tie space to tie space, throwing the cleaned ballast back into empty tie spaces and casting or carrying the screened-out dirt to a point where it can be picked up by a clamshell bucket. In many cases the screened-out material will consist largely of front-end cinders, but in all cases it will be of a character that is not suitable for sub-ballast, for widening shoulders or for filling purposes. It should, therefore, be disposed of in such a place that it will not wash back onto the roadbed.

Whether ballast that cannot be cleaned by power equipment should be cleaned by hand calls for careful study. In many instances, particularly in tunnels, it is more economical to crib out the dirty ballast and dispose of it in its entirety, without cleaning, and then apply new clean ballast in its place.

A Need As Yet Unfilled

By Engineer Maintenance of Way

Owing to the present scarcity of ballast we will probably find it necessary to clean some ballast that, under more favorable circumstances, would be discarded because it is fouled to such an extent that it can never be cleaned to the best advantage. However, we are also suffering from a shortage of track labor to an extent that still remains acute, so that both the shortages of ballast and of labor combine to produce a situation that is not as favorable as it might be.

However, regardless of the plentitude or scarcity of labor, with the few exceptions that will be mentioned, no ballast should ever be cleaned by hand. To do so is not economical from any point of view. In fact, one of the important reasons why such large quantities of ballast were formerly required was that it was cheaper to discard dirty ballast and apply clean new ballast than it was to attempt to clean the foul ballast by hand.

More recently, several designs of ballast-cleaning equipment have become available that do an excellent job of cleaning the shoulder ballast at a relatively low cost. We have some of these machines in operation and consider that they are both effective and economical so far as the cleaning of the ballast on the shoulders and in the inter-track spaces are concerned. So far, however, we have not found what we consider to be a practical device for removing the ballast from the cribs, cleaning it and returning the cleaned material to the track. From our viewpoint this represents one of the most important of the unfilled needs for power equipment.

Cleaning ballast by hand is both slow and costly. Yet there are places where no machine so far perfected is able to do any kind of a job. This refers to the track next adjacent to station platforms, through turnouts, slip switches and crossovers, through railway crossings, through highway crossings and in tunnels. This looks like a formidable array of areas to be cleaned by hand, but it is less formidable than its sounds, for the cleaning needs to be done at any one of these places only at long intervals.

When it does become necessary to clean the ballast at any of these places the work must be done by hand, as it was in the old days for all ballast that was cleaned. However, as was usually done in these days, it is still generally cheaper to dig out and discard the old ballast and replace it with clean new ballast. Normally, the requirements for ballast at these places are small and can easily be taken care of by diverting one or more cars, as may be needed, from some larger operation.

What disposition should be made of the screened-out material? This is usually a matter to be decided on the basis of local conditions, although it may not be amiss to comment on some of the factors that must be taken into consideration. If the waste comes from a track next to a station platform it is obvious that it must be trucked to some point away from the station grounds.

To a less extent the same comment can be applied with respect to the screenings or the dug-out ballast removed from turnouts, slip switches and crossovers, for these facilities are generally on or near station grounds. At railways crossings, most of which are somewhat removed from station grounds, there is usually greater opportunity to dispose of the waste material near the point of its origin without creating unsightly conditions. In many cases there are low spots that can be filled, thereby getting rid of standing water.

Whatever is done with the waste removed from dirty ballast, however, it should never be used to widen the shoulders of embankments. The reason for this is that most of this waste consists of front-end screenings, fine ashes from ash pans, coal dust that has sifted through the bottoms or sides of coal cars and other light and friable material that does not compact well but is easily eroded. This material is too light to make a good foundation for anything, least of all for the ballast toe line. If it is placed be left without adequate support. on the shoulder, the ballast will soon There is no reason, however, why it cannot be cast down below on the shoulder where, in the course of time, it will eventually wash down to the foot of the slope.

Fixed or Revolving Ventilators

What are the relative merits of stationary and revolving ventilators for railway buildings? Where can each type be used most effectively?

Both Are Effective

By General Inspector of Buildings

When correctly designed, with respect to proportions, both types of ventilators are effective. Both depend on the difference of the temperature of the air inside and outside the building for their functioning, the stationary type being dependent almost entirely on this difference. On the other hand, the revolving type also takes advantage of the velocity of the outside air, to increase the flow of the interior air to the outside.

Some of the older types of stationary ventilators did not function satisfactorily when the wind blew in certain directions. In part, this was influenced to a considerable extent by local conditions, by the part of the roof upon which the ventilator was installed and, in part, by the relation of other buildings, with respect to height and location, to the one upon which the ventilator was installed. Today, however, stationary ventilators are available which will function regardless of the direction of the wind, and that are only slightly influenced by the other factors that have been mentioned.

Most building officers prefer the stationary type of ventilator because, once installed, it requires practically no attention from the standpoint of maintenance, except such as is necessary to prevent deterioration from corrosion. Ventilators of the revolving type must be installed carefully or they will not function from the start. They must be levelled at this time or they will not revolve, sometimes even in strong breezes. After installation they require considerable attention because moving parts wear and, if not adjusted or repaired, become noisy. If maintenance is lax the ventilator will not turn in a light breeze. A revolving ventilator that does not revolve does not function as intended, for, instead of pulling the air out of the building, it may reverse the flow and thereby become a nuisance.

Prefers Stationary Type

By Supervisor of Buildings

Formerly, the revolving type of ventilator was used more largely than the stationary type. The reason for this was that almost all stationary ventilators were made too small to carry out the function for which they were supposed to be designed. On the other hand, revolving ventilators of the same general dimensions were more positive in their action and thus caused less complaint regarding their adequacy for the job.

It has not been many years since ventilators of the stationary type refused to function when the wind blew in certain directions. However, through redesign, which includes somewhat larger dimensions and changes in relative proportions, stationary ventilators are now dependable and will function satisfactorily regardless of the direction or velocity of the wind.

Personally, I prefer the stationary ventilator because they are easier to install and cost less in place than the revolving type. It is my experience that, in general, they function as satisfactorily as the rotating type. After installation they give practically no trouble, for there are no moving parts to wear and, in general, protection against corrosion is all that is required to maintain them in good condition.

Revolving ventilators require more attention when they are being installed, since they must be absolutely level if they are to perform their function satisfactorily. After installation they also require frequent attention, because the moving parts wear, the stack binds and will not rotate, or they become so noisy that they annoy the occupants of the buildings upon which they are installed.

As a matter of fact, both types are equally effective, so that in making the decision as to which one is to be used, the other factors which have been mentioned must be given due weight. When one considers that the stationary type is easy and less costly to install and that it can be maintained at low cost, while the revolving type is difficult to install and that both the original installation and the later maintenance are, relatively, much more expensive, these are enough to account for the fact that the stationary type is used much more widely.

Maintaining Anti-Creepers

How much time is a section foreman warranted in devoting to the maintenance of anti-creepers? Why? Where difficulty is encountered in holding the rail as desired what should be done?

One Of Many Tasks

By L. R. Lamport
Engineer of Maintenance, Chicago & North Western, Chicago

The maintenance of anti-creepers is only one of many items essential to good track maintenance to which the section foreman must devote his time. It is necessary that he exercise good judgment in doing the most necessary work first, so that the amount of time he is warranted in devoting to the maintenance of anti-creepers will depend upon the other conditions that confront him.

If the track is well anchored with a sufficient number of effective anchors, only a small part of the foreman's time will be required for their maintenance. He needs, therefore, to devote only sufficient time to the anti-creepers to insure that they function as intended, and that the benefits for which the expenditure for them was made are obtained.

Unfortunately, there are some stretches of track which are subject to heavy rail creepage, upon which inadequate anchorage has been provided, or where there are plenty of anti-creepers of which some do not hold satisfactorily. Under such conditions a conscientious foreman may devote too much time in adjusting and resetting anchors when unusual traffic or sudden changes in temperature occur. Obviously, in such cases, the foreman should rather report a matter of this kind to his supervisor, who should give it prompt attention by providing such additional anti-creepers as are needed. The best efforts of the foreman cannot offset a deficiency in the anchorage of the rail.

Can Eliminate Adjustments

By L. J. Drumeller
Engineer of Track, Chesapeake & Ohio, Richmond, Va.

Certainly the function of anti-creepers is as important to satisfactory maintenance of track as any other unit of the structure. If necessary, we could remove all rail anchors and still continue, in most cases, the safe operation of trains, but this would result in poorer line and surface and, during certain seasons, would entail some hazard. This is true on those portions of the line having steeper grades, heavier rail and higher speeds.

Obviously, the purpose of anti-creepers is to prevent or minimize the running of the rail as a result of temperature changes and traffic. To be effective, they should be applied at the time the rail is laid, and they should be so placed that they will contact squarely the faces of the cross-ties. At varying intervals it may be necessary to adjust the anti-creepers to maintain contact with the ties. If this is not done when needed, the anti-creepers will be useless and might as well be relegated to the scrap bin.

The number of anti-creepers needed to anchor the rail varies, depending on local conditions, but, generally, 16 to the panel will hold the rail under ordinary conditions. If, however, difficulty in holding the rail is encountered, then the number of anti-creepers should be increased to insure that the rail will not run; otherwise those already in service will be ineffective. The addition of a few anchors to each panel of track, and boxing them, will reduce, and sometimes eliminate, the necessity for periodic adjustment and will have the additional advantage of minimizing rail creepage.

Ties Must Be Sound

By W. Woolsey
Section Foreman, Illinois Central, Chicago

To insure that anti-creepers will function as intended the ties against which they press must be sound. Only a few unsound ties will overstrain the anchors against the sound ties. This may result in skewing the tie or in slippage of the rail through the anti-creepers, thus loosening their grip, the final result being about the same as if an insufficient number had been applied in the first place.

Insufficient ballast is another cause for ineffective results from anti-creepers, for the ties will merely slide ahead when the pressure of the anti-creeper becomes greater than the resistance of the deficient ballast section. Again, poorly-maintained track, track that is out of surface or that is center-bound, all contribute to make anti-creepers ineffective.

Overdriving is extremely damaging to all designs of anti-creepers. Some types must be applied with a hammer, but these require a special hammer of relatively light weight to prevent overdriving. Under no conditions should a spike maul or sledge be used in applying anti-creepers. Even a new anti-creeper can be made completely useless by failure to observe this precaution.

If these and similar precautions are observed and sufficient anchors are applied correctly, the section forces will be required to spend only a negligible amount of time on their maintenance.

Too Long Neglected

By Malcolm E. Condon
Track Supervisor, Erie, Campbell Hall, N. Y.

It has been my observation that too little attention has been directed toward the maintenance of anti-creepers, because of too little appreciation of the true value of this fastening in reducing maintenance effort. It is dif-

ficult, however, to make a categorical statement as to how much time should be devoted to their maintenance, particularly since the conditions under which they are used vary between rather wide limits. Obviously, however, sufficient time should be devoted to this important phase of maintenance to insure the continued effectiveness of the anti-creepers that are in service, for if they fail to function they become completely useless and, therefore, of no value.

Every foreman should make a periodic and systematic check of the anti-creepers on his section, just as he checks loose bolts, worn spikes, wide gage and other features of the track that need adjustment or repair from time to time. Under normal conditions, what may be termed a standard installation of anti-creepers will prevent rail creepage and little subsequent maintenance will be necessary.

Where trouble is experienced in holding the rail, all factors that might have contributed to this movement should be analyzed carefully. Perhaps additional anchorage is required; it may be that the existing anchors have become worn or sprung through misuse so that their effectiveness has been impaired and the rail is moving through them. Telltale marks on the rail flanges, heavy cutting into the ties, movement of the ties in the ballast, all are indications that need to be interpreted correctly. After diagnosis and the inauguration of preventative measures, continued checks should be made until the movement of the rails has ceased. Under the foregoing conditions a foreman is forced to spend a disproportionate amount of time in the application and maintenance of the anti-creepers. However, once the movement of the rail has been stopped, subsequent maintenance should be negligible.

In the periodic checks that are made, any anchors not snugly against the tie should be removed and re-applied. Extreme care should be exercised, in both removing and replacing the anchor, not to over-drive or over-spring it. The use of unnecessary force will probably damage the device to the exent that it will be necessary to replace it within a short time.

Anti-creepers should not be tightened against the tie by driving them along the rail base, except where the space between the anchor and the tie is ¼ in. or less. Attempts to drive anti-creepers laterally by repeated blows on alternate projections of the anchor have a tendency to move it into an angular position and reduce its future holding power.

Capacity for Settling Basins

When constructing a settling basin, how much time should be allowed for clarifying muddy water? Should provision be made for using a coagulant? Why? What should be the capacity of the clear-water basin in relation to water consumption?

Requires Special Study

By J. H. Davidson
Water Engineer, Missouri-Kansas-Texas, Parsons, Kan.

There are many factors to be considered in designing a sedimentation basin or tank. These include character and quality of the suspended matter, hydrogen ion concentration, the temperature of the water, the soluble minerals and the alkalinity of the water. For this reason, each water supply, or even a single supply seasonally, requires special study of the most effective design and operation of the sedimentation basin. Therefore, no general rule can be laid down that will apply to the size of settling basins.

Through the use of coagulants, most muddy waters can be settled more quickly and completely than otherwise. Some waters cannot be clarified successfully by settling without coagulation. Therefore, in designing a settling basin, the use of coagulants should be included. Laboratory trial tests should be made first to determine the best coagulant to use and the time required for best results. Correct mixing of the coagulants with the water and subsequent agitation also has an important bearing on the results obtained from the process.

Most railway water supplies are clarified in connection with water softening. Lime, soda ash and sodium aluminate are chemicals commonly used, with iron sulphate and aluminum sulphate or other special coagulants being used when indicated by conditions.

Railway settling basins or tanks are usually of the standpipe type, with water and chemicals entering a "down take" together at the top of the tank where they are mixed thoroughly in moving toward the bottom of the tank. Baffles or other forms of agitation should be provided to insure thorough mixing. Thirty to 40 min. detention in the down take is usually sufficient to obtain good precipitation and flow, and the water then rises in the body of the tank to overflow at the top.

Often Omitted

By J. P. Hanley
Water Service Inspector, Illinois Central, Chicago

Settling basins are not used as extensively by the railways as they are in connection with municipal supplies, which should be crystal clear. In the latter case, turbid water supplies are often run through one or more basins with varying amounts of sedimentation and coagulation. On the other hand, the railways do not require such complete clarification of water for their purposes and, unless the source of supply is unusually turbid and the contour of the land is favorable, the settling basin is omitted.

Where the contour of the land is favorable, a pool should be excavated near the source of supply, of sufficient depth to permit gravity flow. It is advisable to provide three to five hours time to insure settlement of the heaviest particles, and the use of a coagulant may be necessary in extremely turbid waters.

Provision should be made for cleaning the sludge and other sediment from the pool by either mechanically operated buckets or large dredge pumps which will deposit the sludge at some suitable point. In case the supply is taken from a river or other large stream this would most likely be at some point downstream from the intake for the settling pool. In general, it is advisable to provide duplicate basins to permit the use of one pool while the other is being cleaned.

The use of deep concrete basins does not seem necessary for settling railway water supplies, as the cost of such structures is relatively high. Where the contour of the land adjacent to the source of supply is not favorable for excavated pools, the use of conical-bottom, low-tower tanks should be considered. The water can be pumped into one or more of these tanks and allowed to settle three to five hours, after which the clarified water can be pumped to the roadside storage tank. While this arrangement will increase the amount of low-head pumping, it has the advantage of better sludge blow-off and lower first cost.

The tanks also provide a better opportunity for automatic blow-off as well as for automatic application of coagulants. The latter will, in turn, reduce the tank capacity needed, or it will reduce the detention time necessary for the results desired. Careful consideration of all the factors involved in each installation will lead to satisfactory operation.

Staging for Under-Deck Work

How does one construct staging for work below the deck of an open-deck trestle? A ballast-deck trestle? What precautions are to be observed?

Builds Them Lengthwise

By Supervisor of Bridges and Buildings

The more general practice in building staging for work below the decks of trestles is to place the needle beams parallel with the bents, using ledgers and planks to construct the floor of the swinging platform. Personally, I prefer to place the needle beams, three to a bent, parallel with the axis of the bridge. This enables one to place the floor plank directly on the needle beams without the intervention of the ledgers, as is necessary with the other type of staging. Where this is done, the staging is lighter and less cumbersome, but amply strong to carry as many men as need to occupy it at any particular time.

In constructing this form of staging the needle beams are suspended in the same manner as for the other type. The outside needle beams should rest against the outside batter piles, while the intermediate needle beam can be lashed to one of the interior piles, to prevent swinging of the staging. The planks to form the floor should be laid directly on the needle beams, with cleats attached to the underside to prevent endwise movement.

One of the reasons why I prefer this form of staging is that it is suitable for the replacement of both caps and stringers, whereas, if the needle beams are at right angles to the axis of the bridge, the staging thus formed is suitable only for the renewal of the cap. Another advantage of this staging is that it can be swung from the ends of the caps and is thus equally suitable for ballast-deck bridges.

Suspend Needle Beams

By General Inspector of Bridges

In general, staging to facilitate the replacement of caps, or for doing other work below the decks of open-deck trestles, is not built up from or supported by the ground, but is suspended from the deck by means of rope or rod hangers. If the staging is to be used only as a platform for men to work on, two needle beams, each 6 in. by 8 in. by 18 ft., are suspended from the deck, one on each side of the bent, by 1¼-in. manila rope. If, however, the manila rope is not available, the diameter of the rope used should be increased somewhat to compensate for its decreased strength compared with manila rope.

These needle beams should be placed just far enough under the deck to permit men to work on the platform easily. The ropes supporting them may pass under the rail and over the ties, or they may pass around the outside of the guard timbers, as preferred. In general, I like the first method better than the latter. Quite frequently metal guards are used to hold the ropes, and I have seen the ropes fastened to the hand railing. I do not approve this practice for few hand railings are strong enough to make this entirely safe, although the railings may be entirely satisfactory for the purpose for which they were intended. An important point to remember is that, whatever type of fastening is used, care must be exercised to protect the rope against chafing.

Three ledgers, each 4 in. by 6 in. by, say, 14 ft., should be placed through the bent and supported on the needle beams. Next, two or three planks, 2 in. by 10 in. or 12 in. by 20 ft. are placed on the ledgers, on each side of and parallel with the bent to serve as a floor for the working platform. To prevent these planks from slipping endwise, cleats should be nailed to their bottoms, one on each side of each ledger. Since the staging is suspended there is likely to be more or less pendulum action as the men move around on it. This swinging motion can be eliminated by bracing it to the piles or timbers with 1-in. by 6-in. boards.

Hand railings should always be applied to the staging as a safety measure. One good design consists of ⅞-in. round bars, about 30 in. high, upset to 1 in. or 1⅛ in. at the lower ends and set in holes in the ledger pieces. The upper ends of the bars are tapered to ⅜ in. and curled over to make an eye through which a 1-in. line may be threaded to serve as a railing.

Where to Use Gage Rods

Where should gage rods be applied? Why? What are the advantages? The disadvantages?

Particularly In Yards*

By W. H. Sparks

General Inspector of Track, Chesapeake & Ohio, Russell, Ky.

While gage rods are sometimes useful on main-line tracks, their usefulness is much more apparent in yards and on yard leads. On main-line tracks the most important application is just ahead of the headblocks, especially where there is considerable movement through the turnout, as at double-track junctions, at exits and entrances to yards and other similar places. It is true that the heavy switch construction of today includes gage plates on the headblocks, and sometimes on the tie ahead of the headblocks, but it is often desirable to reinforce this protection by placing one or two gage rods ahead of the gage plates.

A similar situation exists in yards where there are numerous switches that handle a large volume of traffic through the turnout side, particularly those on ladder tracks where the movement through the turnout side predominates. There are many other situations in yards, however, that are helped by applying gage rods.

Yard tracks are rarely maintained to the standard followed for main-line tracks. The rail is generally second hand rail, often being rail that is now giving its third stint of service, having been stepped down from main-line tracks to secondary tracks and then to yard service. Ties in yards are scarcely ever maintained as they should be, owing partly to the difficulty of getting possession of tracks for the purpose of tie renewals and surfacing. The obvious result is that they do not give complete support to

the lighter rail that is generally laid in yard tracks.

Under these conditions gage rods can be used to advantage on yard leads, on other busy tracks and even on body tracks that carry an unusual volume of traffic, as well as ahead of switches. I do not favor their use on main tracks as a general practice, except as already mentioned. Good ties and tie plates of ample size, well fastened to the ties, should be sufficient to hold the gage on well-maintained main-line track, except for unusual conditions which must be met as they arise and with regard to the special character assumed by them.

Are Not Necessary

By Chief Engineer Maintenance of Way

As the name implies, gage rods are designed primarily to hold the two rails of the track at gage distance from each other or, more accurately, to prevent the two rails from separating beyond gage distance. This, however, is precisely the function of ties. Where the ties are maintained in sound enough condition to support the rails in surface, and the rails are secured with adequate tie plates, and sufficient spikes, gage rods are wholly unnecessary. Difficulty in maintaining gage on sharper curves is often the result of excessive superelevation.

Too often, gage rods are applied by foremen in lieu of the required maintenance work, usually with the intention that ties will be renewed, track gaged and surfaced within a day or two. The gage rod is then permitted to carry the load until the ties have deteriorated to the point where they can no longer support the rails in surface. If a derailment follows, the gage rods can be considered as having invited deferment of tie renewals and, therefore, contributed indirectly to the derailment.

Manufacturers of gage rods have attempted to overcome this objection to their use by adding shoes to the ends of the rods to act as rail braces and thus prevent the rails from tilting outward.

As evidence that gage rods are not necessary where tie conditions are maintained satisfactorily, we have frequently found gage rods lying in the ballast with one or both ends disengaged from the rail long after the ties had been renewed. Since sound tie conditions make it possible to maintain gage without the use of gage rods, there is no particular advantage in their use.

There is one advantage, however, in the use of gage rods. They should be made a part of wrecking equipment for use to hold the rails to gage only for the purpose of disposing of de-railed equipment. Tie renewals should be made as soon as the derailed equipment is cleared.

Stucco on Old Stations

Under what conditions is it economical to apply stucco to old station buildings? To other buildings? Is it desirable? Why?

Building Must Be Sound

By General Inspector of Buildings

Any building to which stucco is to be applied must be sound structurally, or, for the project to be economical, it must be in such condition that it can be made structurally sound at relatively small expense. The process of overcoating with stucco is neither difficult nor expensive. In most cases the cost of applying the stucco will about equal the cost of removing the old siding and replacing it with new siding. In this event the relative economies of the two methods will be determined by a comparison of the cost of maintaining the two types of construction.

It is not necessary to remove the existing siding in order to apply stucco. It should, however, be renailed to insure a firm base, after which heavy building paper or sheet insulation should be placed over the entire surface to be stuccoed. Over this expanded metal is applied by means of furring nails, the special nails holding it about ⅜ in. away from the paper or insulation. This will place the expanded metal at approximately the center of the finished stucco slab. The stucco itself is then applied in about the same manner as interior walls are plastered, that is, a scratch coat which is forced through the meshes of the metal, a brown coat and a finish coat. Each coat should be given not less than two days of moist curing and then sufficient time to dry thoroughly before the next coat is applied.

The most immediate and obvious of the advantages to be gained by applying stucco to an old building is the improvement in its appearance. One does not need to make the building look like a cheap imitation of the architecture of the Spanish renaissance of the type that may be observed in some real estate developments. In most cases the architectural lines can be retained unchanged. One cannot get away from the fact, however, that there is a real advantage in clean-looking, modernized stations, even at the less important points, on any railway system.

A frame station, if well maintained, must be painted at intervals of three to seven years, depending on its importance and location. Where stucco is applied much of this expense is eliminated since only the doors and the window and door frames, and other small amounts of wood trim, will need painting. The extent of the saving will depend on the intervals between painting which were customary before the stucco was applied.

Suggests Many Cases

By G. S. Crites
Division Engineer, Baltimore & Ohio, Baltimore, Md.

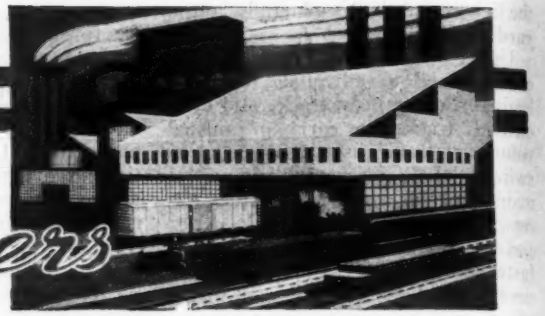
Owing to the greatly-increased cost of suitable lumber in recent years and especially to the prices that must be paid for both material and labor at present, as well as the correspondingly increased cost of applying paint, even where paint-spraying equipment is used, there are many cases where old station buildings may be remodeled or repaired along more pleasing lines than they now present, and the exterior covered with stucco.

This may be accomplished by using a cheap grade of lumber, or perhaps second-hand material, for the sheathing, over which insulating paper is applied. Suitable wood or metal lath can then be placed, allowing a little more than a half inch between the lath and the insulation on metal lath.

Pleasing color effects may be obtained by coloring the stucco, and suitable color effects can be obtained by varying the color or kind of stone chips used in the finish. Correctly constructed stucco walls present a pleasing appearance and there is no reason why they should not continue to do so for many years, without the application of paint, provided steps are taken to insure that baggage trucks or other vehicles do not come in contact with the stucco to damage it.

At present some station buildings are being treated with air-blown concrete finishes, and in many localities it appears that such treatment of station exteriors by either this process or the older method of applying stucco may be justified economically.

PRODUCTS of Manufacturers



Airco Portable Cropping Machine

AIR REDUCTION Sales Company, New York, has perfected a portable rail cropping machine for use in cropping relay rail, both in the field and in material yards. Two oxyacetylene cutting torches are used to cut the rail, one being mounted so as to cut down through the ball of the rail and a portion of the web, while the other torch, located below the base of the rail, is inverted so as to cut upward through the base and the remaining section of the web.

The torches are mounted on a carriage, made of cold rolled steel plate, which is fastened in a bolted frame in such a manner that it can be moved transversely by a hand screw. The frame is fastened to the rail by means of a three-point-contact clamp. The machine is said to be designed for use with all sections of rail now in use.

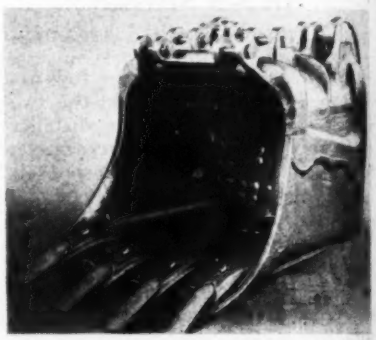
In cropping a rail with the machine, two passes across the rail are made, in the first of which a cut is made by the upper torch. In the second pass, with the carriage moving in the reverse direction, the cut is completed by the inverted lower torch. A metal cap protects the idle torch tip while the opposing tip is in use. Irregularities on the face of the cut may be removed by grinding.

The Airco Portable Rail Cropping Machine in Use

Manganese Steel Welded-Type Dipper

THE American Manganese Steel Division of the American Brake Shoe Company, Chicago Heights, Ill., has introduced the Amsco all-manganese steel, welded-type dipper bucket, which is made in capacities of ¾ cu. yd. and larger. In designing the new bucket, it is said that such factors as the shape, height, length and width of the dipper, the length, pitch and spacing of the teeth, and the lip contour were given consideration to produce an efficient dipper, capable of full loading, quick dumping and long life. The use of austenitic manganese steel in the dipper as the sole material of construction, except for small, complementary parts, is said to provide maximum resistance to wear.

Dipper sizes from ¾ cu. yd. to 2 cu. yd. are made in two pieces, front and back. Larger sizes are made in four pieces, including the front, the back, and two side plates. The various parts are joined with overlapping, rabbeted joints having grooves for a weld bead, and are fitted together with round plugs around which weld metal is deposited. Consequently, the body of the dipper is claimed to be as strong and homogeneous as if in one piece.



Amsco All-Manganese Steel, Welded-Type Dipper as Made in Capacities of ¾ Cu. Yd. to 2 Cu. Yd., Inclusive

Carriage for Setting Spikes

A SPECIAL carriage for use by workmen setting spikes in connection with rail renewals has been developed by the Kershaw Company, Montgomery, Ala. The unit consists of a light carriage which is designed to be rolled along the track, and which includes a spike-carrying receptacle, having a capacity of 1½ kegs of spikes, and a seat for the operator, located immediately above the rail and within easy reach of the spikes. By means of an interchangeable extension arm the carriage may be used on either rail.

To use the carriage the operator, sitting in the seat facing the direction of movement, propels the unit from tie to tie with his feet and sets the spikes by hand, using a small hand

The Kershaw Spike Setter Carriage

maul. It is said that two men, each using one of the carriages, can set spikes for the spike drivers at the rate of one 39-ft. rail per minute. The unit weighs 65 lb. and is equipped with handles so that it can be readily removed from the track.

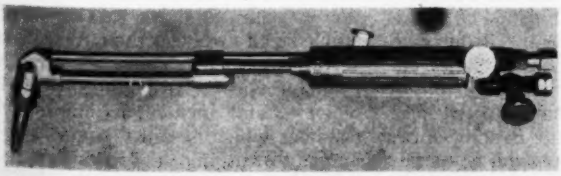
Floor Repairs

THE Stonhard Company, Philadelphia, Pa., has developed a material expressly designed for repairs to railroad floors, which is said to be practically indestructible, even on floors subject to heavy service, such as in car shops, roundhouses and the like, where rough, broken floors endanger personnel and equipment and reduce operating efficiency. This material, which is also impervious to oils, greases and live steam, is supplied ready for immediate application, requiring no mixing or additional materials. Applied in a thickness of ½ in., it is said to bond securely to the old surface and to set up flint-hard in a few hours.

Cutting Blowpipe

A NEW hand-cutting oxyacetylene blowpipe, the Oxweld C-57, has been announced by the Oxweld Railroad Service Company, New York. This new blowpipe, specially designed for railroad use, is now available for all hand-cutting oxyacetylene operations. Rivet-piercing, gouging, and scrap-cutting operations can also be performed with this blowpipe by using special-purpose nozzles designed for these types of work.

The C-57 blowpipe has a packless cutting valve assembly that is said to eliminate the possibility of leakage in the handle. The nozzles have conical seating surfaces that are not easily damaged or marred and which are said to prolong service life even under severe operating conditions.



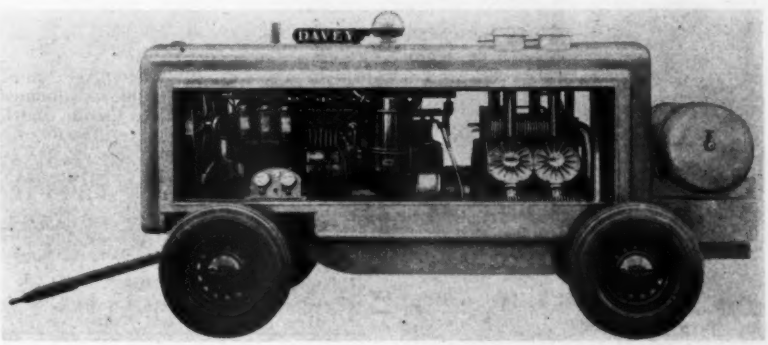
Oxweld C-57 Cutting Blowpipe

Davey Compressor

THE Davey Compressor Company, Kent, Ohio, has announced the first model of its 1947 line of compressors. This model has a capacity of 315 cu. ft. of air per minute at 100 lb. pressure, and is available with either gasoline or Diesel power, being known as model 315W (gas) and 315WD (Diesel). It may be obtained with a flanged-wheel chassis for railway use, and is also available on standard skids or on steel-wheeled or pneumatic-tired trailer mountings.

This compressor is said to represent a new departure in Davey design and consists of two banks of three cylinders, with each bank arranged in a W form. It is said that this construction not only reduces vibration in the compressor to a minimum, resulting in a cooler-operating and more efficient machine, but also permits a substantial reduction in size and weight. The cylinder heads and crankcase in the compressor are of aluminum alloy.

The gasoline-powered compressors are equipped with Hercules RXLD engines, while on the Diesel units an International UD-18 power plant is used. Both models have a height of 72 in. and a width of 65 in., while the overall lengths of the gasoline and Diesel units are 140 in. and 152 in., respectively. The gasoline unit weighs 7,400 lb. and the Diesel model weighs 7,800 lb.



The Davey 315 Cu. Ft. Compressor with a Pneumatic-Tired Trailer Mounting.

Waterproofing Emulsion

THE Socony-Vacuum Oil Company, New York 4, N.Y., reports that leakage through the outside walls of brick and stucco buildings can be prevented by the application of a transparent waterproofing wax emulsion, known as S/V Ceremul W, which is said to possess a number of advantages. The emulsion is diluted in one or two parts of water, depending upon the porosity of the surface to which it is to be applied, and is put on with a brush. Only one application is required, but application is preferable in warm weather so that rapid drying will result.

Among the advantages claimed for S/V Ceremul W are that it breaks down slowly and does not gum up the applicator; and that it produces a long-lasting weatherproofing that is not re-emulsified by rain, affected by heat or cold, or cracked by vibration. Coatings applied more than seven years ago are said to be still successfully resisting the effects of dampness and rain. Furthermore, according to controlled tests conducted by the Bureau of Standards, the emulsion coating demonstrated its effectiveness under conditions far more severe than those generally encountered, and even aged walls of poor-grade brick were given a high degree of protection.

Small Bulldozer

A NEW, small hydraulically-controlled bulldozer that is said to possess all of the engineering features of larger units of this type is now produced by the Industrial division of the Oliver Corporation, Cleveland, Ohio. Known as the Imp, this unit is entirely front-end mounted, leaving the rear of the tractor free for the installation of other equipment. It is said to be simple in installation and may easily be transported from job to job. All movements of the unit-lifting, lowering, holding, and floating are controlled from a single lever. The blade has a reversible cutting edge, rigid moldboard and push arms, and is said to be so constructed that the underframe mounting allows for a minimum width of cut.

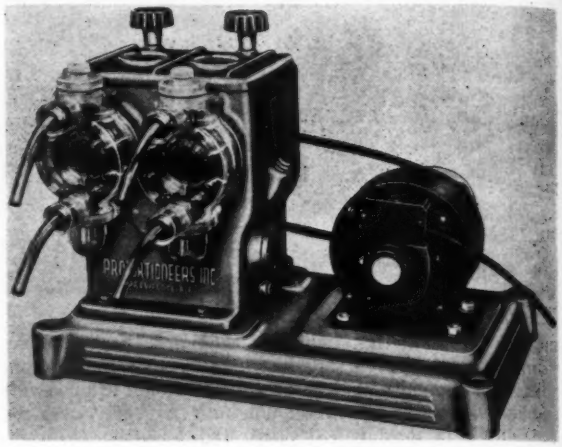
When the Imp is installed on the Oliver Cletrac Model HG-42 crawler tractor, said to be one of the smallest such units on the market, it is claimed that the combination is ideally suited for work that formerly required hand labor or larger grading machines, due largely to the ability of the small unit to operate on soft terrain and in restricted areas.

The Oliver "Imp" Bulldozer Mounted on a Cletrac Crawler Tractor

Duplex Chem-O-Feeder

A NEW chemical, diaphragm-type proportioning pump, named the Duplex Deluxe Chem-O-Feeder, has been released for civilian use by Proportioneers, Inc., Providence, R.I. This feeder is designed for positive injection in an almost continuous stream of one or two chemicals at predetermined and adjustable rates, and is adapted for many uses, including water-softening treatment with liquid reagents.

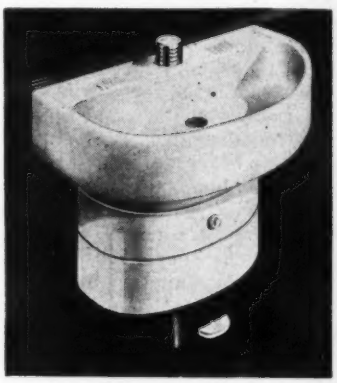
The feeding rate for each chemical is individually adjustable for coarse variations by changing the stroking rate by means of a two-step cone pulley and belt arrangement, while fine variations of solution delivery per stroke are controlled by adjustment knobs on top of the Chem-O-Feeder, which regulate the stroke length. The duplex proportioner has transparent plastic reagent heads for visual observation of diaphragms and check valves while the equipment is in operation, and each discharge stroke is visible through sight feeder domes so that any feeding irregularity may be detected. The moving parts of the pump are enclosed inside a unit case and operate in an oil bath, which insures long wearing life.



The Duplex Deluxe Chem-O-Feeder Provides Positive Injection of One or Two Liquid Chemicals at Predetermined Rates

Two-Person Washfountain

THE Bradley Washfountain Company, Milwaukee, Wis., has added the new DUO model to its line of washfountains, which is finished in stainless steel or white enamel iron, with similarly finished pedestal panel enclosing the connections and mixer. The DUO washfountain is a two-person fixture utilizing the Bradley spray head instead of faucets and is operated by a foot treadle. A deep self-flushing bowl prevents the collection of dirty water. It is said to be highly suitable for use in the washrooms of small plants, shops, offices, drafting room, railroad stations and similar buildings.

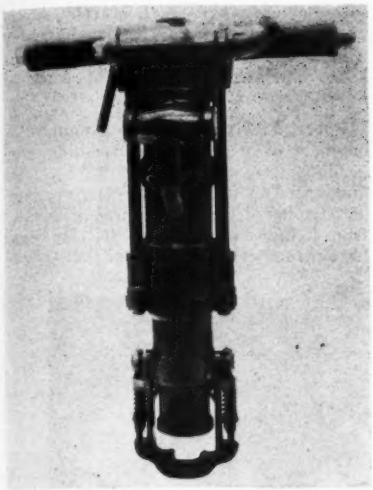


Bradley Duo Washfountain

Rock Drill

SCHRAMM, INC., West Chester, Pa., has added a new rock drill, the D-45, to its line of construction equipment. This drill features a new type of valve, which is said to make the unit faster and more economical in operation. The parts of the drill are made of drop forgings throughout, with each part made of special steel and heat treated for its particular function.

The exhaust ports are arranged so as to direct the exhaust away from the operator and are said to be of ample size to prevent their freezing in severe weather. The D-45 drill is available with both dry and wet-type blowers, and includes a built-in oil chamber which is said to assure automatic lubrication of the working parts.



The Schramm D-45 Rock Drill

The unit has an overall length of 22 in., and weighs 45 lb. It has a 2½-in. stroke, a 2⅝-in. bore and can be used with ⅞-in. or 1-in. steel.

Wayne Crane

THE American Steel Dredge Company, Ft. Wayne, Ind., has produced a new four-ton, self-propelled, rubber-mounted crane unit, known as the Wayne Crane, which is adaptable for use as a power shovel, trench hoe, dragline or clamshell, as well as for general hoisting. The new unit is said to be highly suitable for use in material and erecting yards, and for trenching, ditching and light excavating.

The Self-Propelled Wayne Crane

In the new unit, a 62-hp. gasoline engine drives all four wheels as well as the hoisting and swinging mechanism. All machinery gears are enclosed and are oil-immersed. Other features of the new unit include a self-leveling chassis for operation on uneven ground, and an operator's cab with full vision in all directions. It is said that the new unit can travel, swing, boom and hoist at the same time. There is no center pin, the cab revolving on a 48-in. ball race.

The general specifications of the Wayne Crane are: ½ cu. yd. capacity as a shovel, clamshell or dragline; four-ton crane capacity at 10 ft. radius; 30 ft. boom length as a crane, clamshell or dragline; 15 ft. boom length as a shovel or trench hoe; 7 ft. 8 in. wheel base; and four travel speeds, up to 15 m.p.h.

G-E Tri-Clad Motor

THE General Electric Company, Schenectady, N.Y., has added a new totally-enclosed, fan-cooled motor to its line of Tri-Clad induction motors. The new motor, especially designed for use in extremely dusty, dirty and corrosive atmospheres, is available in standard, explosion-proof and dust-explosion-proof types, from 1 to 1,000 hp. It is claimed that the new motor can be used safely in coal chutes, grain elevators, and in atmospheres containing vapors of gasoline, naphtha, alcohols and natural gas.

A Tri-Clad Totally Enclosed, Fan-Cooled, Induction Motor, Rated at 5-Hp.

An outstanding feature of the new motor is said to be its double-shell, cast-iron frame, and the cast-iron end shields and conduit box which protect it from damage from external blows, dripping water, dust, vapors, and corrosive liquids. Also, sealed-end shields, inside joints and one-piece, double-shell stator protect the windings, punchings and rotating parts, and long, close-running shaft fits, supplemented by a rotating seal, keep dirt from entering the motor along the shaft. Punchings and windings within the inner shell of the motor are cooled by a non-sparking external fan which is protected by a cast-iron housing with a screened air-intake opening.

The cast-iron bearing housings are cast integral with the end shields as a barrier to the entrance of foreign material. The motor uses the pressure-relief greasing system, permitting lubrication without disassembling or stopping the motor. It is claimed that simple, inexpensive control equipment can be used because low starting current makes the motor suitable for full-voltage starting. It is also said that the motor has a high pull-up torque, making for rapid acceleration, and a high maximum running torque to meet temporary abnormal peaks and low-voltage conditions.

New Fire Extinguisher

A NEW carbon-dioxide fire extinguisher has been added to the line of extinguishers manufactured by the Randolph Laboratories, Inc., Chicago. Known as Model 15, because it will contain 15 lb. of carbon-dioxide gas, the unit weighs 50 lb. underload and is said to be particularly suited for combatting the sudden flamable liquid and electrical blazes that are common in certain types of structures. The gas container has a flat base so that it can stand without assistance, and an arched-steel handle at the top for carrying purposes. A thumb trigger-valve is located immediately above the handle, and a cylindrical nozzle is connected with a suitable length of hose.

The Randolph Model 15 Fire Extinguisher in Use. Inset Shows Valve

When a blaze occurs, the operator removes the extinguisher from the wall, grasping the handle and nozzle in one hand. Upon arrival at the fire, he grasps the nozzle handle with his free hand, aiming it at the base of the flames. Pressure on the thumb-trigger discharges the carbon-dioxide gas while release of the trigger automatically stops the flow.

Changes in Railway Personnel

General

L. O. Puckett, assistant architect on the Southern, at Charlotte, N.C., has resigned to become superintendent of buildings for the Belk Investment Company, also at Charlotte.

C. B. Bryant, assistant to vice-president in charge of research and tests on the Southern, at Washington, D.C., has been appointed chief engineer, technical board, Wrought Steel Wheel Industry, Chicago.

N. E. Manville, assistant engineer on the Cleveland, Cincinnati, Chicago & St. Louis, at Springfield, Ohio, has resigned to become superintendent of the Dayton Union Railway Company, with headquarters at Dayton, Ohio.

Robert H. Smith, whose election to the presidency and a directorship of the Norfolk & Western was reported in the July issue, was born in Baltimore, Md., in 1888, and received his early education at Fort Collins (Colo.) high school and Tome

Robert H. Smith

school at Port Deposit, Md. His many years of railroading—all of which have been spent with the Norfolk & Western—began in July, 1910, when he took a job as axeman and chainman in the road's engineering department at Roanoke, Va., while on vacation from Princeton university. Following graduation in chemical engineering from Princeton in 1911, he worked as masonry inspector and transitman in the engineering department until 1913, when he was promoted to assistant roadmaster on the Radford division.

He became roadmaster in 1914, and was advanced to assistant superintendent of the Pocahontas division in 1917. Two years later he was transferred in the same capacity to the Radford division, where he was promoted to superintendent in December, 1922. In 1931 Mr. Smith became superintendent of the Eastern general division, and in 1934 he became superintendent of the Western general division.

Mr. Smith was appointed general manager in 1936, and in addition was advanced to vice-president in May, 1939, serving in those capacities until his promotion to vice-president in charge of operations.

J. W. Smith, assistant general superintendent on the Seaboard Air Line, at Savannah, Ga., and an engineer by training and experience, has been appointed assistant to the president, with headquarters at Norfolk, Va.

Anton Anderson, assistant chief operating officer and chief engineer of the Chicago, Indianapolis & Louisville, with headquarters at Lafayette, Ind., has been appointed general superintendent, with the same headquarters. He will also continue to serve as chief engineer. The positions of chief operating officer and assistant chief operating officer have been abolished.

Dean F. Willey, assistant general manager in charge of the engineering, maintenance and mechanical departments of the New York, New Haven & Hartford, at New Haven, Conn., and an engineer by training and experience, has been appointed assistant vice-president in charge of operation, maintenance and engineering, with the same headquarters.

John A. Schwab, whose appointment as general superintendent of the Southern division of the Pennsylvania, with headquarters at Wilmington, Del., was reported in the June issue, was born at Menoken, N.D., on July 26, 1903, and was graduated from the United States Military Academy at West Point, N.Y., in 1927. He entered the service of the Pennsylvania later that year as a rodman, advanced to assistant supervisor in 1928 and to supervisor in 1930. He became assistant division engineer of the Middle division in 1934, then acting division engineer of the Eastern division in 1935, of which he was named division engineer in 1936. Mr. Schwab was promoted to superintendent of the Logansport division in 1938, transferring to the Delmarva division in 1939, then to the Buffalo division in 1941. In 1942, he went to Philadelphia, Pa., as superintendent of freight transportation; then he became superintendent of the Maryland division in 1943, and transferred to the Pittsburgh division in 1945. He held the latter post at the time of his recent appointment.

Engineering

Paul Sterling, assistant to chief engineer on the New York, New Haven & Hartford, has retired.

Charles F. Ehrlich, assistant engineer on the Missouri Pacific, with headquarters at St. Louis, Mo., has retired after more than 54 years of railroad service.

F. J. Cavan, supervisor of track on the Lehigh Valley, at Buffalo, N.Y., has been promoted to division engineer, with the same headquarters. **H. F. Reilly,** division engineer at Buffalo, has been transferred to Jersey City, N.J. **A. J. Murphy,** supervisor of track at Sayre, Pa., has been transferred to Buffalo. **J. A. Senall** has been appointed supervisor of track at Sayre.

Robert F. Wood, whose appointment as engineer of bridges of the Reading, with headquarters at Philadelphia, Pa., was announced in the August issue, was born on October 1, 1890, and was graduated from Lehigh university in 1911. He began his railroad career in July of that year as

Robert F. Wood

a rodman on the Erie at Williamsport, Pa., serving subsequently as carpenter and master carpenter. Mr. Wood was named supervisor in 1920, then resigned to serve the New York Central as engineer draftsman from 1923 until 1927, when he rejoined the Reading as assistant engineer at Philadelphia. He was promoted to office engineer there in 1943, and in March, 1946, became acting bridge engineer.

Benjamin Chappell, whose appointment as engineer of track on the Western region of the Canadian National, with headquarters at Winnipeg, Man., was reported in the July issue, was born on June

B. Chappell

8, 1903, at Port Arthur, Ont., and, in 1927, was graduated in civil engineering from the University of Saskatchewan. Mr. Chappell entered railway service as a chainman on the Canadian National in 1923, working summer vacations in a similar capacity until 1927, when he became a draftsman in the office of the division engineer at

Regina, Sask. After serving in various other positions, he was promoted on February 15, 1940, to assistant engineer in the district engineer's office at Saskatoon, Sask., where he served until January, 1945, when he became division engineer on the Portage-Brandon division, with headquarters at Winnipeg. One year later he was advanced to special engineer, with the same headquarters, the position he held at the time of his recent promotion.

M. B. Allen has been appointed division engineer on the New York, Chicago & St. Louis, with headquarters at Frankfort, Ind., succeeding **R. E. Oberdorf,** who has been transferred to the Lake Erie & Western district.

G. L. Field, assistant engineer on the Canadian National, at Toronto, Ont., has been appointed division engineer at Capreol, Ont., succeeding **J. A. Des Trois Maisons,** who has been transferred to Montreal, Que.

H. J. Fast, assistant division engineer on the Canadian National, at London, Ont., has been appointed division engineer at Hornepayne, Ont., succeeding **D. M. Trotter,** who has been transferred to Montreal, Que.

G. E. Stewart has been appointed division engineer on the Portland division of the Southern Pacific, with headquarters at Portland, Ore., succeeding **G. Hazelton,** assigned to other duties.

D. A. Sipe, supervisor of track on the Pennsylvania, at East Liberty, Pa., has been appointed assistant division engineer at Pittsburgh, Pa., where he replaces **D. Davis, Jr.,** who has been incapacitated for an indefinite period.

A. B. Chapman, whose promotion to engineer and superintendent of bridges and buildings on the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at Chicago, was reported in the August issue, was born at Elmwood, Neb., on February 24, 1890, and received his

A. B. Chapman

higher education at the University of Washington. He entered railroad service in May, 1919, as a structural draftsman on the Chicago, Milwaukee, St. Paul & Pacific, at Seattle, Wash. From April, 1922, to June, 1929, he served as office engineer at Seattle, and from the latter date until December, 1930, he served as principal assistant engineer on the Seattle Grade Separation Committee. In January, 1931, he was appointed assistant engineer on the Milwaukee, and served in that capacity until April, 1933, when he became a structural draftsman at Chicago, where he was appointed chief draftsman in July, 1938. Mr. Chapman became office engineer at Chicago in November, 1938. In June, 1942, he was appointed bridge engineer, with headquarters as before at Chicago, the position he held at the time of his recent promotion.

Irwin H. Schram, whose appointment as chief engineer of the Erie, with headquarters at Cleveland, Ohio, was announced in the July issue, was born at Milwaukee, Wis., on October 14, 1888, and was graduated from the Armour Institute of Technology, Chicago, Ill., with the B.S.C.E. degree. He entered railroading in 1908 as a rodman on the Erie, subsequently serving as transitman and assistant engineer, and advancing to the position of division engineer in 1916. He became trainmaster in 1918, terminal superintendent in 1920, and regional engineer in 1921, serving in the latter post at Hornell, N.Y., and Chi-

Irwin H. Schram

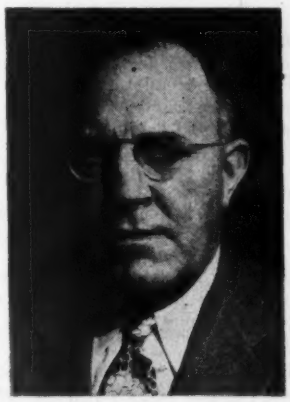
cago. In 1927, Mr. Schram was named engineer maintenance of way, at Hornell, transferring to Jersey City, N.J., in 1932. He was appointed acting chief engineer maintenance of way at Cleveland in 1943, and became chief engineer maintenance of way there in 1944, maintaining the latter position until his recent promotion.

J. F. Salmon has been appointed bridge engineer on the Canadian National, at Toronto, Ont., with jurisdiction over the Central region, succeeding **C. P. Disney,** who has retired.

Maurice A. Michel, inspecting engineer on the Pittsburgh & Lake Erie, has been appointed designing engineer, at Pittsburgh, to succeed **John R. Boyd,** whose death is reported elsewhere in these columns. **William F. Hanna,** building inspector, has been appointed inspecting engineer, replacing Mr. Michel.

J. V. Middleton, supervisor of track of subdivision 26, Pennsylvania division of the New York Central, at Jersey Shore, Pa., has been appointed to the newly created position of assistant division engineer on the St. Lawrence division, with headquarters at Watertown, N.Y.

Blair Blowers, whose appointment as chief engineer maintenance of way (system) of the Erie, with headquarters at Cleveland, Ohio, was announced in the July issue, was born on April 28, 1893, at Troupsburg, N.Y., and entered railroad-



Blair Blowers

ing as a rodman on the Erie in 1912, becoming assistant estimator in 1913 and head of the engineering corps in 1917. From 1917 until 1919, Mr. Blowers served in the United States Army, then returned to the Erie in his former post. Later in 1919, he was advanced to general yard foreman, then became track supervisor in 1920, assistant engineer in 1922, and assistant division engineer in 1925. He served as division engineer at Jersey City, N.J., and Hornell, N.Y., from 1927 until 1942, when he was named acting engineer maintenance of way, Western district, at Youngstown, Ohio. He was named engineer, maintenance of way, Western district, at Youngstown, in 1944, and maintained this post until his recent advancement.

Harry J. Weccheider, whose appointment as engineer maintenance of way, Western district of the Erie, with head-

Harry J. Weccheider

quarters at Youngstown, Ohio, was announced in the July issue, was born on May 13, 1895, at Buffalo, N.Y., and entered railroad service in 1915, with the Erie. After serving as timekeeper, section foreman, and general foreman, he was appointed track supervisor at Susquehanna, Pa., in 1923. He was advanced to general

roadmaster at Youngstown, in March, 1928, then to division engineer at Meadville, Pa., in December of the same year, transferring to Jersey City, N.J., in 1942. Mr. Weccheider maintained the latter position, in which he held jurisdiction over the New York division and side lines, until his recent promotion.

K. E. Bomar, assistant cost engineer on the Rivanna and Piedmont subdivisions of the Chesapeake & Ohio, at Richmond, Va., has been transferred to the Mountain and James River subdivisions, with headquarters at Clifton Forge, Va., succeeding **C. M. Kern,** whose promotion to assistant supervisor of track, Mountain subdivision, Clifton Forge, was reported in the August issue. **R. H. Abbott,** assistant cost engineer of the Peninsula subdivision, at Richmond, Va., has been transferred to the Rivanna and Piedmont subdivisions, with the same headquarters, succeeding Mr. Bomar.

Gunnar Tornes, whose retirement as superintendent of bridges and buildings on the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at Chicago, was reported in the August issue, was born at Bergen, Norway, on June 30, 1889. He entered railway service on October 26, 1906, as a laborer on the Milwaukee and served as carpenter foreman and construction foreman until 1914, when he was promoted to general construction superintendent of the Minneapolis (Minn.) track depression work. In 1917 he was advanced to division supervisor of bridges and buildings, with headquarters at Mitchell, S.D., and in 1927 he was promoted to general supervisor of bridges and buildings, Lines East, with headquarters at Chicago. In 1931 he was advanced to the position he held at the time of his retirement.

Track

Charles H. Jones, track supervisor on the Atchison, Topeka & Santa Fe, at San Bernardino, Cal., has retired after 54 years of railroad service.

Fred L. Morris has been appointed track supervisor on the Erie, with headquarters at Hornell, N.Y., succeeding **J. G. Ainey,** whose appointment as assistant division engineer at Marion, Ohio, was reported in the July issue.

W. D. Wells, section foreman on the Springfield division of the Illinois Central, has been appointed supervisor of track at Palestine, Ill., succeeding **T. J. Brosnahan,** deceased.

M. L. Horton, assistant to the general roadmaster on the Atlantic Coast Line, at Florence, S.C., has been appointed acting general roadmaster, with the same headquarters, succeeding **J. W. Hughes,** who has been granted a leave of absence.

J. L. Forrester, assistant supervisor of track on the Pennsylvania, at Mansfield, Ohio, has been appointed supervisor of track at Kittanning, Pa., succeeding **W. C. Bowser,** who has been transferred to East Liberty, Pa., where he replaces **D. A. Sipe,** who has been appointed assistant division engineer, at Pittsburgh, Pa., where he relieves **D. Davis, Jr.,** who has been incapacitated for an indefinite period.

C. D. Binning, assistant supervisor of track at Columbus, Ohio, has been transferred to Mansfield, where he replaces Mr. Forrester. **W. A. Thomson,** supervisor of track at Wellsville, Ohio, has been transferred to Carnegie, Pa., where he replaces **A. E. Himler,** who in turn has been transferred to Wellsville. **R. R. McClain,** assistant on the engineering corps at Chicago, has been appointed assistant supervisor of track at Columbus, where he replaces Mr. Binning.

W. H. Gibson, roadmaster on the St. John subdivision of the Canadian Pacific, has been appointed roadmaster on the Galt subdivision, with headquarters at London, Ont., replacing **K. O. Shepard,** who has been granted a leave of absence on account of ill health. **P. H. Jones,** section foreman on the New Brunswick district, has been promoted to roadmaster on the St. John subdivision, succeeding Mr. Gibson.

J. F. Smith, who has been on leave of absence to serve on the U. S. Railway Missions in Mexico, has returned to the Missouri Pacific and resumed his duties as roadmaster at North Little Rock, Ark., replacing **L. L. Wallis,** who has been transferred to Gurdon, Ark. **D. B. Smith,** acting assistant roadmaster at Gurdon, has been appointed assistant roadmaster on the Louisiana division, with headquarters at Ferriday, La., succeeding **A. W. Wood,** acting assistant roadmaster, who has resumed his duties as section foreman.

Leslie G. Bell, assistant supervisor of track on subdivision 13, Buffalo division of the New York Central, at Buffalo, N.Y., has been promoted to supervisor of track on subdivision 26, Pennsylvania division, with headquarters at Jersey Shore, Pa., succeeding **J. V. Middleton,** whose appointment as assistant division engineer is reported elsewhere in these columns. **Francis J. Donnelly,** assistant supervisor of track on the Syracuse division at Syracuse, N.Y., has been transferred to Buffalo, replacing Mr. Bell.

J. C. Warren, supervisor of track on the Pennsylvania at Jersey City, N.J., has been transferred to Trenton, N.J., succeeding **S. M. Rodgers,** who has been assigned temporarily to the accounting department at Philadelphia, Pa. **C. F. Lagano,** assistant supervisor of track at New York, has been promoted to supervisor of track, with headquarters at Jersey City, succeeding Mr. Warren. **R. M. Buchanan,** assistant supervisor of track on the New York division at Jamesburg, N.J., has been advanced to main-line assistant supervisor of track, with headquarters at New York, succeeding Mr. Lagano.

B. S. Buskovick, roadmaster on the Chicago, Rock Island & Pacific, at Atlantic, Iowa, has been transferred to Rock Island, Ill., succeeding **M. H. Bootier,** who has been transferred to Cedar Rapids, Iowa, replacing **J. W. Loftus,** who in turn has been transferred to Peoria, Ill., where he succeeds **Melvin Lau,** who replaces Mr. Buskovick at Atlantic. **J. K. James** has been transferred to Des Moines, Iowa, as acting roadmaster, replacing **J. E. Crawford,** who has been granted a leave of absence on account of illness. **R. P. Scott,** roadmaster at El Reno, Okla., has been transferred to St. Joseph, Mo., succeeding **Noble Hurt,** who has been transferred to Pratt, Kan., where he replaces **S. P. Jones,** who has retired. **C. M. Berry** has been transferred to El Reno as acting roadmaster, to replace Mr. Scott.

Bridge and Building

Paul D. Haines, assistant supervisor of bridges and buildings on the Pere Marquette, has been appointed supervisor of bridges and buildings, with headquarters at Saginaw, Mich., succeeding **A. L. McCloy** whose retirement was reported in the August issue.

S. R. Thurman, assistant bridge and building supervisor on the Joplin-White River divisions of the Missouri Pacific, with headquarters at Nevada, Mo., has been appointed bridge and building supervisor on the same divisions, succeeding **W. H. Begeman,** who has been transferred to the Eastern division, with headquarters at Jefferson City, Mo., where he replaces **T. J. Flessa,** acting bridge and building supervisor, who has resumed his former duties as bridge and building foreman. The position of assistant bridge and building supervisor on the Joplin-White River divisions has been abolished.

Water Service

Ira D. Brown, road mechanic on the Chesapeake & Ohio, at Peru, Ind., has been appointed supervisor of water supply, with headquarters at Russell, Ky., succeeding **R. L. Cooper,** deceased.

Special

S. G. Urban, assistant engineer on the Missouri Pacific, at St. Louis, Mo., has been appointed architect on the Texas & Pacific, at Dallas, Tex.

J. W. Johnson has been appointed forestry agent on the Illinois Central, with headquarters at Jackson, Miss., succeeding **C. W. Robertson,** who has been transferred to Baton Rouge, La.

James S. Giddings, superintendent of the tie-treating plant of the Atchison, Topeka & Santa Fe, at National City, Cal., has been appointed superintendent of that road's tie and lumber preserving plant at Somerville, Tex., succeeding **William E. Jackson,** who has retired after 43 years of service with the Santa Fe. **A. W. Perry,** inspector at the road's treating plant at Topeka, Kan., succeeds Mr. Giddings as superintendent of the plant at National City.

Obituary

H. F. Archer, retired roadmaster on the Atlantic Coast Line, died at Ridgeland, S.C., on July 20.

Richard D. Overholt, division engineer on the Canadian Pacific, at Saskatoon, Sask., died recently in that city.

John R. Boyd, designing engineer on the Pittsburgh & Lake Erie, died on July 1, after an illness of several months.

Association News

Maintenance of Way Club of Chicago

Required to give up the usual meeting place of the club at Huyler's Restaurant, the Executive committee, after an exhaustive search for a new headquarters, met on August 26 and decided upon Harry Burke's Restaurant on the main floor of the Railway Exchange Building, 80 E. Jackson Blvd. The first fall meeting of the club will be held on Monday, October 28, at or before which time the new Year Books of the club will be ready for distribution.

Record Exhibit Planned by Two Supply Associations

For the first time in the long history of both the Track Supply Association and the Bridge and Building Supply Men's Association, these two organizations plan to hold a joint exhibit this year, at the Stevens Hotel, Chicago, from Monday, September 16, starting at 12:00 noon, Chicago daylight saving time, through Thursday of that week. The occasion which has made this possible is the concurrent, but not joint, annual meetings of the Roadmaster's Association and the American Railway Bridge and Building Association at the Stevens Hotel, September 17-19—the exhibit opening the day preceding the meetings of the association.

Reflecting an enthusiastic attitude on the part of supply companies, 87 manufacturers have obtained space, all that is available, for displaying their products. Nineteen of these companies will have exhibits for the first time, while eight had not exhibited for several years prior to the war. Although there will be many familiar products, not a few of them have been improved in various ways since they were last shown. There will also be a large number of tools, materials and units of work equipment that have not been on exhibit previously.

The officers of the Track Supply Association who are responsible for the planning, preparation and conduct of the exhibit of track materials this year are, president, H. C. Hickey, The Rail Joint Company, Inc., Chicago; first vice-president, H. M. McFarlane, O. F. Jordan Company, East Chicago, Ind.; second vice-president, J. B. Templeton, Templeton, Kenly & Co., Chicago; secretary-treasurer, Lewis Thomas, Q.&C. Company, Chicago: directors, H. E. Kirby, assistant engineer, Chesapeake & Ohio, Richmond, Va. (honorary); C. O. Jenista, Barco Manufacturing Company, Chicago; L. I. Martin, Morden Frog & Crossing Works, Chicago; Kenneth Cavins, Fairmont Railway Motors, Inc., Chicago; T. E. Rodman, Maintenance Equipment Company, Chicago; R. W. Torbert, Oxweld Railroad Service Company, Chicago; and Edward Wray, Railway Purchases and Stores, Chicago.

Likewise, the officers of the Bridge and Building Supply Men's Association who have arranged for the exhibits of bridge and building materials and supplies are, president, G. B. Coffey, A. M. Byers Company, Chicago; vice-president, W. L. McDaniel, Massey Concrete Products Company, Chicago; treasurer, G. R. Betts, Armco Drainage and Metal Products, Inc., Chicago; secretary, E. C. Gunther, Duff-Norton Manufacturing Company, Chicago: directors, R. Y. Barham, American Rolling Mill Company, Chicago (honorary); G. W. Morrow, Worthington Pump & Machinery Corporation, Chicago; S. W. Hickey, *Railway Engineering and Maintenance*, Chicago; C. E. Croisant, Lehon Company, Chicago; and Howard Mull, Warren Tool Corporation, Chicago.

Lewis Thomas, acting as Director of Exhibits, has handled the applications and allotment of space for the members of both associations.

A list of the exhibitors follows:

Air Reduction Sales Company.
American Brake Shoe Company.
American Fork & Hoe Company, The.
American Lumber & Treating Company.
Armco Drainage & Metal Products, Inc.
Austin-Western Company.
Barco Manufacturing Company, Not Inc.
Bernuth, Lembcke Company, Inc.
Buda Company, The.
Cartier Supply Company.
Chicago Pneumatic Tool Company.
Chicago Steel Foundry Company.
Chipman Chemical Company, Inc.
Crerar, Adams & Company.
Cullen-Friestedt Company.
Dearborn Chemical Company.
A. P. deSanno & Son, Inc.
Duff-Norton Manufacturing Company, The.
Electric Tamper & Equipment Company.
Eutectic Welding Alloys Corporation.
Evans Products Company.
Fabreeka Products Company, Inc.
Fairmont Railway Motors, Inc.
Gradall Division, Warner & Swasey Company.
Hayes Track Appliance Company.
Homelite Corporation.
Hubbard Company.
Illinois Malleable Iron Company.
Independent Pneumatic Tool Company.
Ingersoll-Rand Company.
Johns-Manville.
O. F. Jordan Company.
E. B. Kaiser Company.
Kalamazoo Manufacturing Company.
Kershaw Company, The.
Koehring Company.
Lehon Company, The.
Le Roi Company.
R. G. LeTourneau, Inc.
Link Belt Speeder Corporation.
Lugdie Engineering Corporation, The.
Maintenance Equipment Company.
Mall Tool Company.
Marvel Equipment Manufacturers, Inc.
Massey Concrete Products Company.
Master Builders Company, The.
Mississippi Supply Company.
Modern Railroads.
Morden Frog & Crossing Works.
Morrison Railway Supply Corporation.
Murdock Manufacturing & Supply Company.
Nordberg Manufacturing Company.
Northwestern Motor Company.
Oliver Corporation, The.
Oliver Iron & Steel Corporation.
D. W. Onan & Sons.
Overhead Door Corporation.
Oxweld Railroad Service Company, The.
P & M Company, The.
Pettibone Mulliken Company.
Pittsburgh Pipe Cleaner Company.
Pocket List of Railroad Officials, The.
Power Ballaster Company.
O and C Company, The.
Racine Tool & Machine Company.
Rail Joint Company, Inc., The.
Railroad Equipment.
Railroad Products Company.
Rails Company, The.
Railway Engineering and Maintenance.
Railway Maintenance Corporation.
Railway Purchases and Stores.
Railway Trackwork Company.
Reade Manufacturing Company.
Rust-Oleum Corporation.
Snap-On Tools Corporation.
Sperry Products, Inc.
Syntron Company.
Taylor-Colquitt Company.
Templeton, Kenly & Company.
Timber Engineering Company.
Union Metal Manufacturing Co., The.
Warren Tool Corporation.
Woodings-Verona Tool Works.
Woodings-Forge & Tool Company.
Woolery Machine Company.
Worthington Mower Cmpany.
Worthington Pump & Machinery Corporation.

American Railway Engineering Association

Eleven committees have scheduled meetings to be held in September. Of these, five committees will hold their meetings at Chicago to coincide with the concurrent annual conventions of the Roadmasters' Association and the American Railway Bridge & Building Association. These include the Committee on Roadway, which will meet on September 18 and 19; the Committee on Track, to meet on September 17; the Committee on Buildings, to meet on September 16 and 17; the Committee on Masonry, to meet on September 17 and 18; and the Committee on Maintenance of Way Work Equipment, to meet on September 16. All of these committees will meet at the Hotel Stevens, except that on Buildings, which will hold its meeting at the association headquarters in Chicago, 59 East Van Buren Street.

Other committees scheduling meetings for September are those on Water Service and Sanitation, to meet on September 4; Uniform General Contract Forms, September 9; Highways, September 24; Yards and Terminals, September 24 and 25; and Economics of Railway Location and Operation, September 26 and 27. All of these committees will meet at the association's headquarters in Chicago, except the Committee on Yards and Terminals, which will hold its meeting at the Hotel Roanoke, Roanoke, Va.

Several items of business of general interest were transacted during a meeting of the Board of Direction held at Chicago on August 6. Among these was the adoption of a recommendation requiring that all material in the Manual be reapproved at intervals of not less than ten years. Also E. E. Oviatt, chief engineer, New York, New Haven & Hartford, was named a director to fill the unexpired term of the late G. A. Haggander, assistant chief engineer, Chicago, Burlington & Quincy, who died on April 14. The Board of Direction also endorsed a petition naming D. J. Brumley, retired chief engineer, Chicago Terminal Improvements, Illinois Central, as an honorary member. The next meeting of the board is scheduled to be held on November 19.

Rust Prevention in Water Tanks—The Johnston & Jennings Company, Cleveland, Ohio, has published an illustrated four-page broadside describing the Rusta Rustor method of neutralizing the electrochemical action that causes rusting of the under-water surfaces of steel water tanks. Included are a brief discussion of the installation, operation and maintenance costs of the Rusta Rustor system and a return addressed postcard for use in obtaining an estimate of the cost of installing the system in any particular steel tank.

Supply Trade News

Personal

Robert C. Myers has been appointed assistant manager, market development division, of the **Carnegie-Illinois Steel Corporation.**

V. H. Hribar, recently released from the armed forces, has returned to his position of chief chemist of the **American Lumber & Treating Co.,** Chicago.

Brown & Hubert, Inc., 216 S. E. 8th Street, Evansville, Ind., have been appointed distributors by the **Davey Compressor Company,** Kent, Ohio.

Ray D. Cunningham has been appointed director of sales of the **Nox-Rust Chemical Corporation,** Chicago.

Leigh B. Block, vice-president of the **Inland Steel Company,** has been elected a director of the firm, succeeding **J. H. Morris,** who retired recently as secretary of Inland Steel.

Paul W. Kimball has been elected president of the **American Locker Company, Inc.,** succeeding **Hamilton W. Baker,** whose death on June 14 is reported elsewhere in these columns.

D. E. Fricker, recently released from the armed forces, has returned to the **Le Roi Company,** Milwaukee, Wis., as assistant to the advertising manager, with headquarters at Milwaukee.

Carl Djuvik, bridge engineer on the Tennessee Central, at Nashville, Tenn., has joined the engineering department of the **Jones & Laughlin Steel Corporation,** at Pittsburgh, Pa.

John R. Craig, recently released from the armed forces, has been appointed assistant to the vice-president in charge of sales for the **Taylor-Wharton Iron & Steel Co.,** Easton, Pa.

Arthur C. Wilby, who has been in charge of public relations for subsidiary companies of the **United States Steel Corporation** at Chicago, has been elected a vice-president of U. S. Steel, with the same headquarters.

S. B. Applebaum, H. L. Tiger, and **N. E. Brice,** formerly with the Permutit Company, have formed the **Liquid Conditioning Company,** with offices at 423 West 126th Street, New York.

Willard M. Broxham, manager of the Philadelphia (Pa.) office of the **Graver Tank & Mfg. Co., Inc.,** East Chicago, Ind., has been appointed manager of sales for the company's fabricated plate division, with headquarters at East Chicago.

Independent Pneumatic Tool Company, of Chicago, manufacturer of Thor portable pneumatic and electric tools, has announced the opening of a new branch sales office in St. Paul, Minn., located at 220 West Seventh street. It is managed by **Joseph A. Bell,** for the past six years sales representative of the company in that area. The new office will serve all of Minnesota, the eastern portions of North and South Dakota, northwest portion of Wisconsin, and the upper peninsula of Michigan.

Howard Oxsen, manager of the Diesel engine department of the San Francisco (Cal.) branch of **Fairbanks, Morse & Co.,** has been promoted to manager of the company's branch house at Seattle, Wash., succeeding **John F. Marquitz,** who will be assigned to new duties elsewhere.

E. W. Chapman has been appointed chief engineer of the newly-created industrial pump division of **Bowser, Inc.,** with headquarters at Fort Wayne, Ind. Mr. Chapman was formerly chief engineer of the Blackmer Pump Company, Grand Rapids, Mich.

George B. Coffey, railroad service engineer for the Chicago division of the **A. M. Byers Company,** Pittsburgh, Pa., has been appointed division manager, with the same headquarters, succeeding **W. A. Taylor,** who has resigned to enter private business. Mr. Coffey was born at Bloomington, Ind., on June 1, 1902, and was graduated from Indiana University in 1924.

George B. Coffey

From 1924 to 1926 he served in the city engineer's office at Bloomington, and from 1926 to 1930 as manufacturer's representative at Indianapolis Ind. In 1930 he entered the service of the A. M. Byers Company as field engineer in the Indianapolis territory and served in that capacity until 1934 when he was appointed railroad service engineer at Chicago the position he held at the time of his recent promotion. Mr. Coffey is president of the Bridge & Building Men's Association and a member of the American Society of Heating and Ventilating Engineers.

R. E. Wagenhals, quality control engineer for the **Timken Roller Bearing Co.,** Canton, Ohio, has been appointed director of quality control for all bearing divisions of the company. **Sherman R. Lyle,** formerly in the Timken steel sales department has been appointed sales engineer for the Cleveland district. **William E. Bryden,** New York district sales engineer before becoming a member of the steel division of the War Production Board, has been appointed sales engineer for the Chicago district. **Alfred J. Kinnucan,** recently released from the armed forces and formerly associated with the Empire Finished Steel Corporation, has been appointed district sales engineer for New York.

G. K. Squier, formerly assistant manager of railway sales of the **Standard Oil Company** (Indiana), has been appointed manager of railway sales to succeed **J. Clay Lee,** who has retired after more than 40 years of service with the company.

R. W. Gillmore, sales engineer for the **Allis-Chalmers Mfg. Co.,** at Indianapolis, Ind., since 1935, has been appointed manager of the company's new branch office at Evansville, Ind. **Anthony Lebesch,** superintendent of the company's No. 1 gray iron foundry at Milwaukee, has been advanced to assist the superintendent of the company's No. 1 and No. 2 brass foundries.

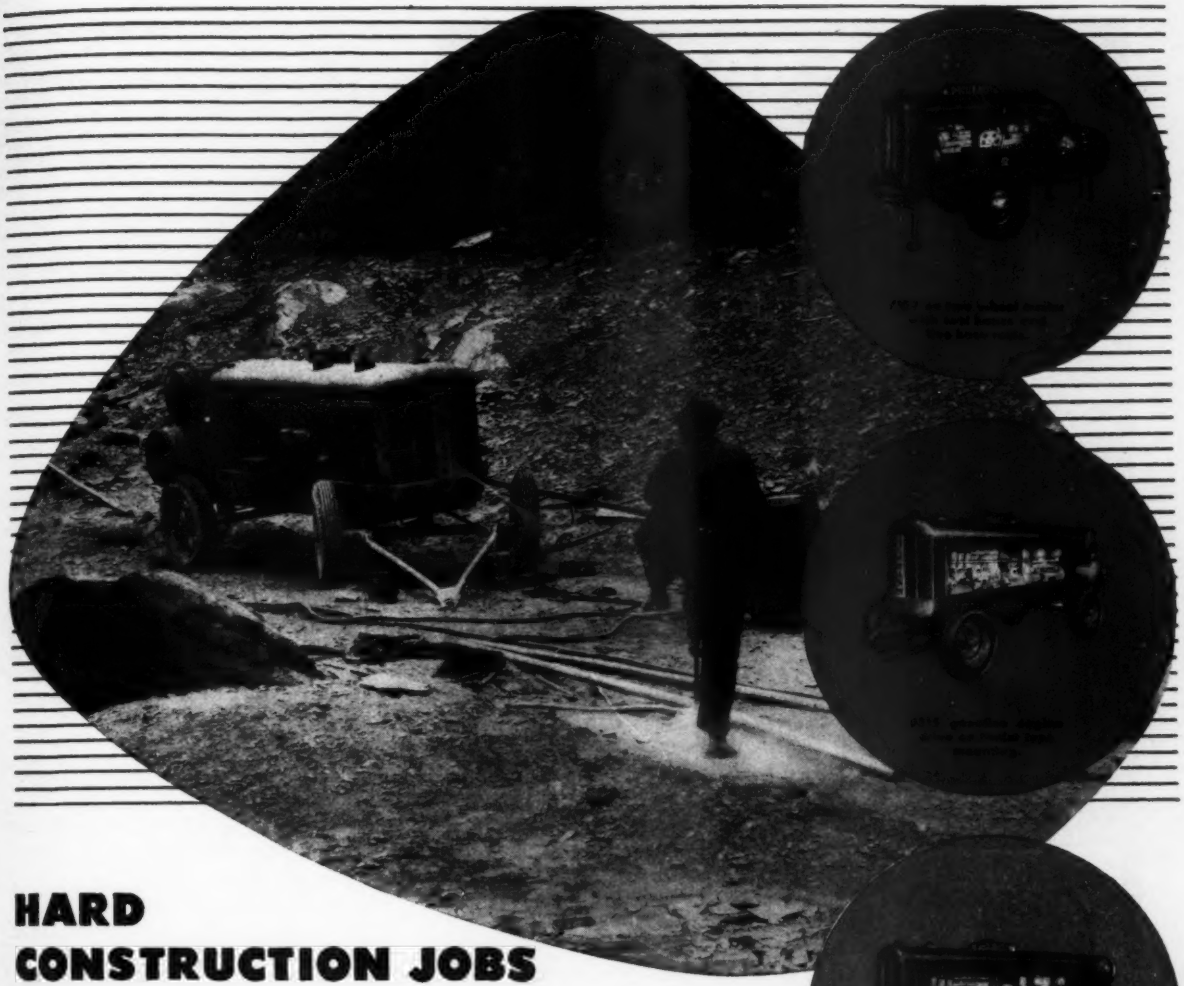
Under the direct management of **Frank L. Ross,** vice-president in charge of all Eastern activities for the **Hyster Company,** the company's new plant at Danville, Ill., expects to achieve full production capacity by fall. The operating personnel of the new plant includes **Jay Misenhimer,** factory manager; **Jim Woodley,** assistant factory manager; **William Morrow,** purchasing agent; and **Ray Smith,** office manager.

Appointment of the Wabash Equipment & Supply Company, Test Building, 54 Monument Circle, Indianapolis, Ind., as distributor of Davey compressors, has been announced by the **Davey Compressor Company.** Wabash will offer complete sales and service facilities on all items of Davey manufacture. Wabash was founded in April by R. W. "Bill" Schwartz following his return from 40 months' service in the U. S. Navy. Present plans call for establishment of a sales and service branch in Ft. Wayne, and at another southwestern Indiana location, in the near future.

Max Riebenack III, manager of the Philadelphia (Pa.) office of the **Industrial Brownhoist Corporation,** Bay City, Mich., has been elected vice-president in charge of sales, with headquarters at Bay City, succeeding **James B. Hayden,** who has retired. The corporation has announced the following additional changes in its sales organization: **H. D. Wright,** manager of the New York office, becomes director of sales for the eastern seaboard, with headquarters at New York; **C. H. White,** district sales manager at Chicago, becomes director of sales for the southern and western portions of the United States, with headquarters at Chicago; **James A. Peppard** continues as district sales manager of the central region, with headquarters at Cleveland, Ohio; **A. P. Lyvers,** assistant district sales manager at Chicago, becomes district sales manager, with the same headquarters; **Stanley See,** recently released from the armed forces and formerly in the sales department at Bay City, becomes district sales manager at Philadelphia, Pa.

Charles R. Cox on August 1 became president of Carnegie-Illinois, succeeding Mr. Perry. Mr. Cox has been president of National Tube Company, another U.

(Continued on page 964)



HARD CONSTRUCTION JOBS CALL FOR SCHRAMM AIR COMPRESSORS

There are many compressed air jobs that are hard . . . downright hard! Here's where Schramm Air Compressors come in. Schramm features enable compressed air jobs to be done easily—quickly—economically!

Illustrated is a Schramm Compressor at work—and 4 pictures of Schramm Air Compressors. These are but a few of many Schramm models—all designed for heavy duty, continuous service, with minimum attention. The 100% water cooled feature enables you to operate Schramm Compressors with doors closed, keeping out dirt and gravel.

Schramm Compressors range in size from 20 to 420 cu. ft. actual air, in every type of mounting and assembly.

NOTE: Pneumatic Tools can be offered with all size Schramm Compressors and for almost any requirement including Rock Drilling, Paving Breaking, Backfill Tamping, Tie Tamping, Concrete Vibrating, Chain Saws and Circular Saws, etc.

For full details on Schramm models and tools, write today.

SCHRAMM INC.

THE COMPRESSOR PEOPLE
WEST CHESTER
PENNSYLVANIA

CHARGE BATTERIES *On the spot*

ROLL IT OUT
PLUG IT IN
PRESS A BUTTON

Features

PRIME MOVER: Onan two-cylinder, four-cycle, water-cooled gasoline engine.

GENERATOR: Onan four-pole, shunt-wound, Direct Current. Direct-connected for permanent alignment. Interpoles for sparkless commutation.

VOLTAGE RANGE: 32 to 50 Volts.

RATING: 97 Amperes at 36 Volts.

STARTING: Electric push-button.

CONTROLS: Rheostat and charge-rate Ammeter for close voltage regulation. All other necessary electrical and engine meters are included.

ONAN ELECTRIC PLANTS are available in sizes from 350 to 35,000 Watts.

ALTERNATING CURRENT: 115 and 230 Volts, 50 and 60-cycle, single-phase for all capacities. Three-phase for models 3 KW or larger. Other voltages and frequencies available.

DIRECT CURRENT: 115 and 230 Volts, 600 to 10,000 Watts. 6, 12 and 32-Volt Battery Charging types to 3500 Watts.

This Onan Battery Charger is specially designed for servicing batteries which supply current for coaches and Pullman cars. With a 32 to 50-Volt range, it charges both "lead acid" and Edison-type batteries. Capacity rating is 3500 Watts.

Powered by an Onan two-cylinder, water-cooled, four-cycle gasoline engine, this sturdy unit is built for long life and trouble-free service.

The Onan Battery Charger is completely self-contained, and protected from the weather by a heavy-gauge, sheet-steel housing.

Mounted on pneumatic tires, the plant is rolled easily by one man to set-out cars. Electric push-button starting simplifies and speeds servicing operations.

WRITE FOR MORE INFORMATION

D. W. ONAN & SONS INC.
4418 Royalston Ave. Minneapolis 5, Minn.

TYPICAL RAILROAD USES OF ONAN POWER PLANTS
Charge batteries. Supply power for maintenance tools. Furnish light for construction jobs. Power radio communication equipment.

POWER & LIGHT FOR EVERY NEED
Onan
ELECTRIC PLANTS

REPRESENTATIVES IN ALL PRINCIPAL CITIES

(Continued from page 962)

S. Steel subsidiary, since March, 1943. Joining the National Tube Company as general superintendent, Ellwood Works, in 1934, Mr. Cox's rise in that company was rapid. In 1936 he was made vice-president in charge of operations; in 1941, executive vice-president; and 1943, was elected president of National Tube.

Born in Schenectady, N.Y., in 1891 and educated at New York university, Mr. Cox started his business career in 1914 with Marwick, Mitchell-Peet & Co., chartered accountants, New York. From 1918 to 1920 he was affiliated with the United States Shipping Board Emergency Fleet Corporation. In 1920 he came to Pittsburgh with the Crucible Steel Company of America, and from 1930 to 1934 was associated with Babcock & Wilcox Tube Company, Beaver Falls, Pa. Mr. Cox was in personal charge of the ordnance development at the Christy Park works of National Tube in McKeesport, Pa. In co-ordination with other plants of the company, Christy Park turned out 28 million pieces of ordnance, including shell forgings, finished shells and bombs of all types for the Army and Navy both before and during the last war. It was under his immediate direction that tremendous quantities of large size seamless pipe for both the "Big Inch" and "Little Big Inch" petroleum pipe lines were produced in record time at the Lorain, Ohio, works of the company, and that aircraft and other specialty tubing production was stepped up in plants at Gary, Ind., and Ellwood City, Pa.

J. Lester Perry, who rose from a steel plant clerk to the presidency of Carnegie-Illinois Steel Corporation, retired August 1 as head of this U. S. Steel subsidiary to become assistant to the president of **United States Steel Corporation.**

Mr. Perry, a native of Worcester, Mass., began his business career as a cost clerk in the Worcester operations of American Steel & Wire Company on his graduation from high school in 1899, two years before the United States Steel Corporation was formed. He was transferred to the operating end of the industry as a foreman of the cold rolling department in 1913. From then on he rose rapidly in the Worcester plants of American Steel & Wire through the positions of assistant superintendent and superintendent, becoming manager of the company's Worcester district in 1928. He was appointed vice-president of the company in charge of operations in 1933, with headquarters in Cleveland, Ohio. Two years later Mr. Perry was elevated to the presidency of Tennessee Coal, Iron & Railroad Company at Birmingham, Ala., another U. S. Steel subsidiary. On January 1, 1938, he became president of Carnegie-Illinois Steel Corporation.

Obituary

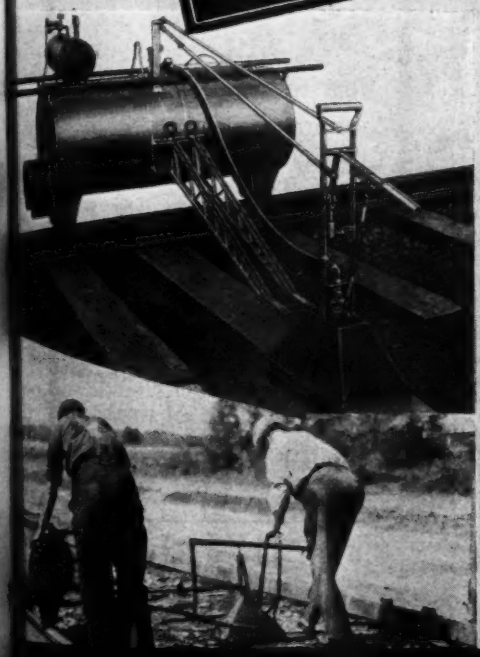
Ross M. Blackburn, district manager at Chicago for the Buda Company, whose death at the Presbyterian hospital in the city on July 25 was reported in the August issue, was born at Arlington, Neb., in 1882, and after a public school education

(Continued on page 966)

There's a TRACK STORY Back of the Headlines

Newly commissioned "Pere Marquette," first postwar streamliner, Michigan's first diesel-drawn train, inaugurates (with its twin) de luxe service between Detroit and Grand Rapids.

PERE MARQUETTE



WHILE the speed, beauty, and glamorous "personality" of luxury trains make news, the unspectacular work of track maintenance, indispensable to their performance, goes on unpublicized.

TO implement the track-work program that insures the safe running and scheduled speed of its new streamliners, the progressive Pere Marquette utilizes modern maintenance machinery, including WOOLERY CREOSOTE SPRAYERS.

These efficient, labor-saving machines apply exact amounts of creosote to newly-adzed ties cheaper, faster, far more safely, and much better than outmoded hand swabbing or broom-and-pail methods.

Only two men are required to operate a WOOLERY CREOSOTE SPRAYER. One man pushes the carriage mounting a 60-gallon tank and generator burner for heating the creosote; the other man operates the wind-protection spray hood. The normal operation of lifting the hood by the handle pumps a metered charge of creosote into the nozzle; pushing the handle down forces the creosote out under the hood in a heavy fan-shaped spray, without hazard of skin burns and clothing damage.

WOOLERY MAINTENANCE EQUIPMENT

Tie Cutters **Weed Burners** **Creosote Sprayers**

WOOLERY MACHINE COMPANY

MINNEAPOLIS — Pioneer Manufacturers of — MINNESOTA

RAILWAY MAINTENANCE EQUIPMENT

RAILWAY WEED BURNERS · MOTOR CARS · TIE CUTTERS · TIE SCORING MACHINES · RAIL JOINT OILERS · CREOSOTE SPRAYERS · BOLT TIGHTENERS

EXCLUSIVE EXPORT REPRESENTATIVES: PRESSED STEEL CAR COMPANY, INC., PITTSBURGH, PENNA.

TUNNEL LINER THAT FITS THE JOB!

No paying for excess weight when you use ARMCO Tunnel Liner Plates. There is a type and gage to meet every tunnel condition. This means you can order ARMCO Tunnel Liner to really *fit the job!*

These sturdy plates are relatively light in weight, yet deep corrugations and flanges insure a high strength/weight ratio. ARMCO *Heavy Duty* Liner Plates are available for tunnels where unusually heavy load conditions are encountered.

Whether it's for new tunneling or a relining job, the work goes fast with ARMCO Plates. Even inexperienced crews can install them quickly. One man easily handles the strong steel sections, bolting them together with an ordinary wrench.

Write for complete data on ARMCO Tunnel Liner for your next tunnel. Armco Drainage & Metal Products, Inc., 1345 Curtis Street, Middletown, Ohio.

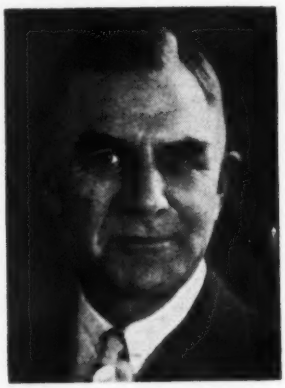
EXPORT: THE ARMCO INTERNATIONAL CORPORATION

ARMCO

Armco Tunnel Liner

(Continued from page 964)

at that point entered the service of the Chicago & North Western in 1902, subsequently becoming general storekeeper at Chicago. He left the North Western on January 1, 1926, to enter the sales department of the Buda Company, with headquarters at Chicago, being advanced to district manager with the same headquarters in 1934. Mr. Blackburn was a past-president of the Track Supply Association, having served in this capacity in 1942, and was a director of the association at the time of his death.



Ross M. Blackburn

Hamilton W. Baker, president of the American Locker Company, Inc., since its organization in 1931, died on June 14 at his home in Chestnut Hill, Mass.

B. V. E. Nordberg, executive engineer of the Nordberg Manufacturing Company, Milwaukee, Wis., and son of the late Dr. Bruno V. Nordberg, founder of the company, died on August 19 at the age of 62.

Trade Publications

Earth Drills—The Buda Company, Harvey, Ill., has issued an eight-page folder which describes the four types of earth drills, and their mountings, that are manufactured by this company. The folder is liberally illustrated to show the earth drills in action drilling holes for fence posts, line poles, soil testing, bridge piles, and foundation piles.

Waterproofing Specifications—Truscon Laboratories, Inc., Detroit, Mich., have published Book "A" citing both the complete and the briefed specifications that can be used for contracts specifying Truscon waterproofings, damp-proofings and concrete specialties. The book, which is illustrated, is divided into three sections, namely: waterproofings, damp-proofings, and miscellaneous.

American—This is the title of a newly-issued 28-page general catalog covering all the products manufactured by the American Hoist & Derrick Company, St. Paul, Minn. The pamphlet is well illustrated and attractively printed in color. Of particular interest in the railway field are the sections devoted to wire rope clips, blocks and sheaves, car pullers, locomotive cranes, ditchers and pile drivers.

We'll be Seeing You...

EXHIBITION BRIDGE & BUILDING TRACK SUPPLY ASSOCIATION

at the Exhibition of the Bridge and Building Men's Association and The Track Supply Association September 16-19 Hotel Stevens, Chicago.

We will have our new exhibit of TECO connectors for railway timber construction.

Tell your friends to meet you at the TECO booth.

Over 70 roads have used the TECO connector system of timber construction.

TIMBER ENGINEERING COMPANY

WASHINGTON

CHICAGO NEW ORLEANS

MEN
WHO KNOW TOOLS

MODEL 125
½" Capacity

Go for Mall Drills
REG U.S. PAT. OFF.

In the tool room . . . in the maintenance department . . . on the right-of-way . . . top-flight mechanics call for MallDrills. They know MallDrills have more than enough power, speed and stamina to drive twist drills into steel . . . take auger bits through hard or soft wood and drill plastics with a template. In fact, every feature of MallDrills clicks with men who use them. Their cool operation under load . . . light weight and pistol grip that reduces fatigue . . . compact design that simplifies drilling in close quarters and cramped positions . . . and the quick, easy servicing of commutator and replacing of brushes without dismantling the drill.

Ruggedly constructed of the finest material for hard continuous use, with die cast aluminum alloy housings, 3-jaw, geared chucks, helical cut, hardened steel alloy gears, and universal motors. 5 powerful models with ¼", 5/16", ⅜" and ½" capacities. Each available in 2 voltages—110-volt AC-DC or 220-volt AC-DC.

Ask your Supplier or write for literature and prices.

EXHIBITOR
BRIDGE & BUILDING TRACK SUPPLY ASSOCIATIONS
HOTEL STEVENS, CHICAGO SEPT. 16-17-18-19, 1946

Railroad Department
MALL TOOL COMPANY
7746 South Chicago Ave.,
Chicago 19, Illinois

25 Years of
"Better Tools For Better Work."

Mall REG U.S. PAT. OFF. **PORTABLE POWER TOOLS**

Right WITH THE RAIL GANG

Jackson Portable Power Plant, made by Electric Tamper & Equipment Co., powered by single cyl. Wisconsin Engine.

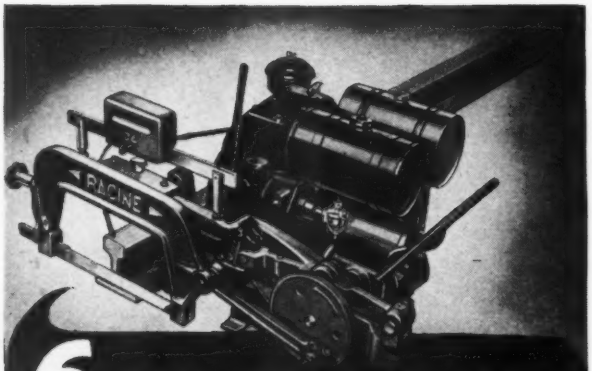
WISCONSIN
HEAVY-DUTY *Air-Cooled*
ENGINES . . .

A properly mechanized rail gang requires a variety of power tools for the most efficient and economical utilization both of man-power and machine-power. One way to make sure that you have the right equipment, in the right place, at the right time . . . is to make sure that your tools are powered by Wisconsin Heavy-Duty Air-Cooled Engines.

Easy portability, heavy-duty dependability and complete freedom from cooling chores and troubles in all weather, at all seasons, are factors that ideally adapt Wisconsin Engines to railway maintenance service . . . supplying power for tampers, tie cutters, rail and frog grinders, air compressors for pneumatic tools, motor cars and many other machines that require rugged serviceability from the power unit.

Wisconsin Heavy-Duty Air-Cooled Engines are supplied in a complete range of types and sizes, 4-cycle single cylinder and V-type 4-cylinder, within a 2 to 30 hp. power range.

Most H.P. per pound **WISCONSIN MOTOR** Corporation
MILWAUKEE 14 WISCONSIN U.S.A.
World's Largest Builders of Heavy-Duty Air-Cooled Engines



6 RAIL CUTTING JOBS made easier, quicker with RACINE *portable* Rail Saws

Now you can do your rail maintenance and repair jobs right on the track. No need for heavy "on track" equipment or extra hauling of rails to central cropping plant. Racine Rail Saws require only one man to operate. Two men can easily transport saw from rail to rail.

These fast, accurate machines, produce a smooth, clean-cut job without overheating rail ends. Model 15 for rails to 7⅜" high. Model 16 for rails to 10" high. Models are available with gas engines, compressed air or electric motors. Write for complete catalog No. 58A. Address RACINE TOOL AND MACHINE COMPANY, 1738 State Street, Racine, Wis.

1. Cutting and fitting rails at interlocking plants, crossings and switches.
2. Closing track in rail laying operations.
3. Smooth, accurately cut rail for insulated joints.
4. Proper staggering of joints in curves.
5. Removing split, worn and battered rail ends.
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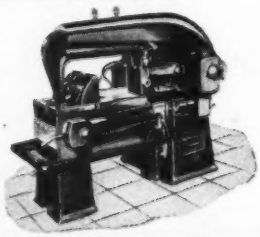
Now Available! Racine gas engine driven Rail Saws for immediate delivery.

METAL SAWS FOR RAIL SHOPS

Racine Heavy Duty Metal Saws pay for themselves through their many time and labor saving features. Simple controls, smooth automatic hydraulic operation make them the ideal saws for rail shops for cutting axle shafts, boiler pipe, channels, angles and beams quickly and accurately. Capacities 6" x 6" to 20" x 20". Ask for complete descriptive catalog No. 12.



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RACINE

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We control every step of their manufacture — from the specification of the specially-developed formula and process used in making the steel to the forming, hardening, tempering and testing operations.

Their dependability has been proven by years of actual service on hundreds of railroads.

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SPECIALIST MANUFACTURERS OF SPRING WASHERS

The NEW LIGHTWEIGHT • LOW PRICED "TIMBERHOG" GASOLINE SAWS

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52 Lbs. $325.00

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HORSEPOWER: Lightweight 2 cycle 4 H. P. air cooled gas engine, die cast of aluminum and magnesium. Power far in excess of load requirements.

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TIMBERHOG SAWS
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Provides the Protection You Need!

Rust resulting from the action of water, sulphur, brine, acid, etc., is a costly proposition. But now you can stop that loss with RUST-OLEUM Rust-Preventive.

RUST-OLEUM'S ability to check and prevent rust lies in its specially processed oils. It penetrates every metal pore, loosens the rust elements, and incorporates them with the coating of the film—leaving a tough rust-resistant film that won't blister, crack, or peel off.

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Check These Features:

- Excellent coverage—gallons of economy.
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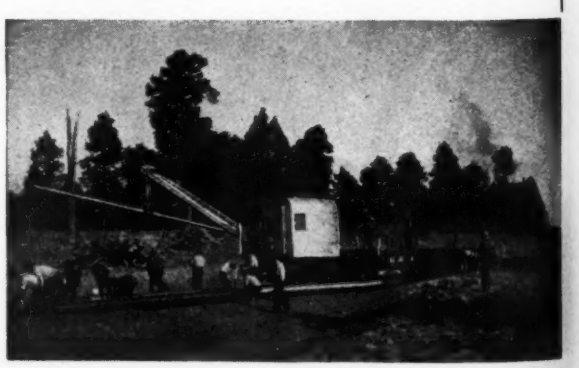
BURRO DOES EVERY JOB EFFICIENTLY, ECONOMICALLY

Whether the Burro is used to speed track laying or relocation, for bridge building, earth or ballast handling or on locomotive coaling jobs, it will handle every job more efficiently and economically—because Burro Cranes are built for railroad work.



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For floors, steps, walkways, platforms and elevator hatchways, it provides structural strength and safety. The attractive 4-way pattern cleans easily and drains freely.

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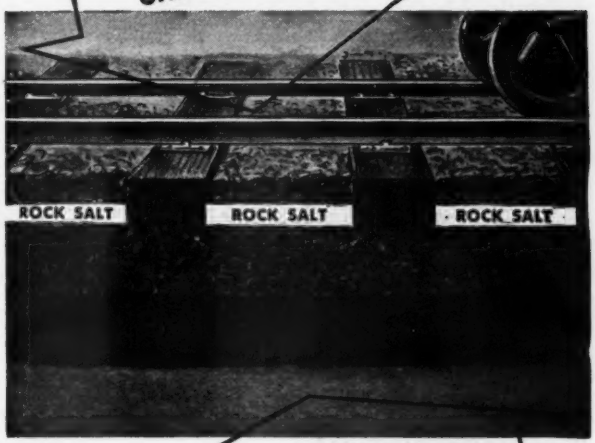
MULTIPLY YOUR SAFETY HERE



HALVE THE COST OF TRACK HEAVES HERE

TRACK HEAVES caused by freezing of excessive moisture in roadbed soils or subsoils are eliminated all winter by a *single* application of Sterling Rock Salt in late summer or early fall.

Properly applied, rock salt provides utmost safety for rail traffic. And compared with laborious shimming, it reduces track-heave-control costs by 30 to 50 per cent.

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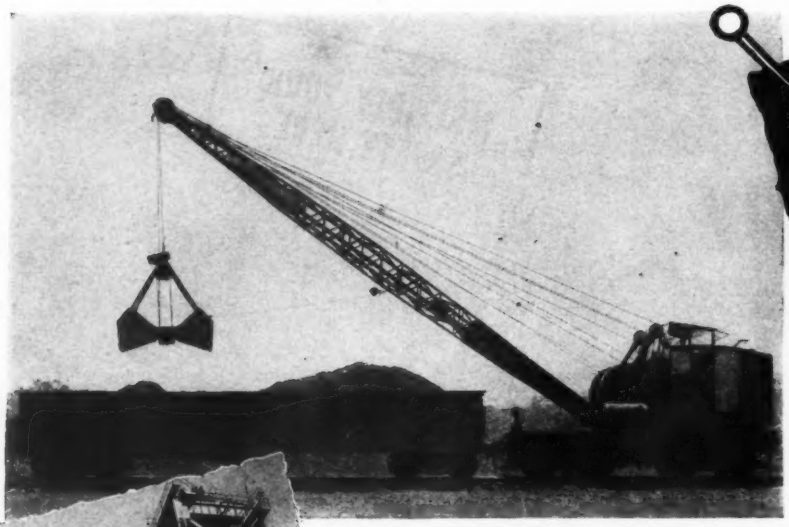
We urge you to write today requesting free consultation with an International field engineer on how to increase safety, cut costs, with Sterling Rock Salt.

INTERNATIONAL SALT COMPANY, INC., SCRANTON, PA.



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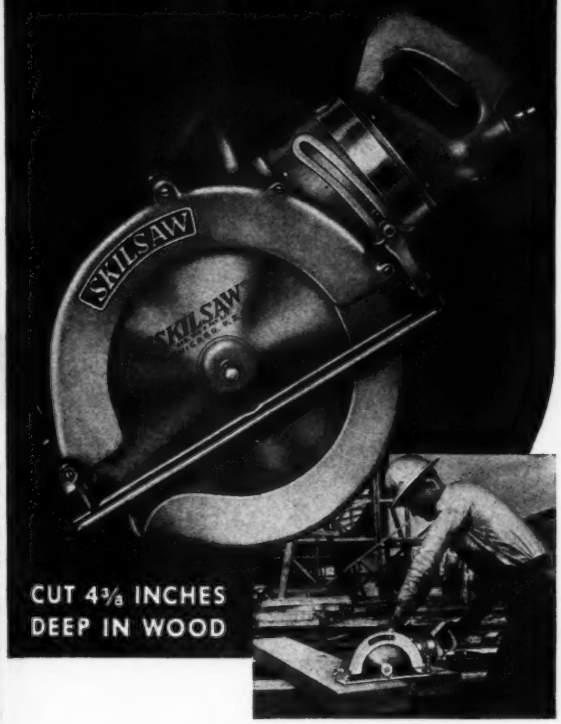

• Pneumatic SKILSAW operates efficiently anywhere you have an 80 to 100 lb. air pressure line . . . cuts fast through flooring and bracing for freight cars . . . speeds bridge and trestle building, station and warehouse repairs. Outstanding safety is provided by leak-proof poppet-type throttle valve which cuts air off instantly when closed. Positive safety lock prevents accidental starting. Telescoping guard shields blade. Call your distributor today for a demonstration!

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MADE BY SKILSAW, INC.

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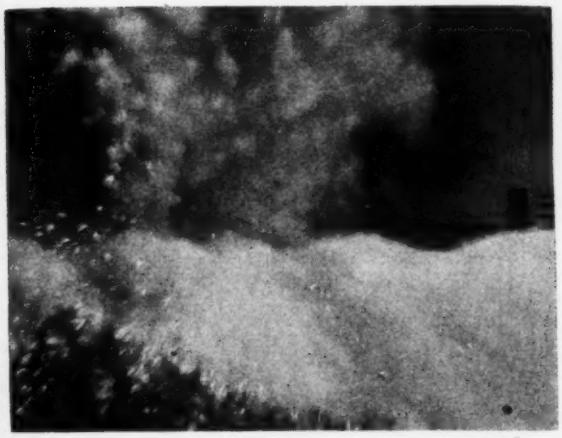
. . . . IN GOES THE JORDAN
AND OUT COMES THE SNOW

in summer
. . . . WELL TRIMMED BALLAST
AND WELL DRAINED TRACK



This huge, powerful "mechanical crew" does many jobs that no other machine can do — does all its jobs better, faster, at lower cost.

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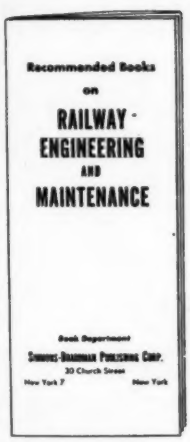

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Squeezing Water Upward
SQUEEZES UPKEEP DOWN

PEERLESS HI-LIFT PUMPS
Reg. U.S. Pat. Off.

For low-cost limited water supply demands of multiple industrial uses.

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Peerless HI-LIFT is the pump that gives magic wings to water lift, with an ingenious pumping element.

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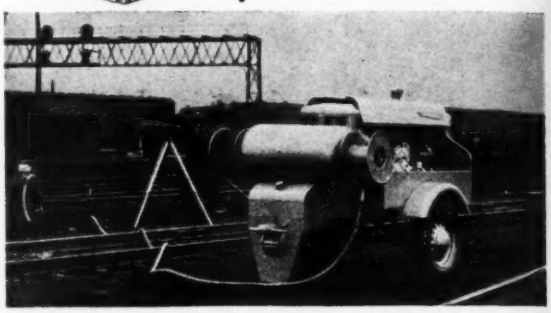

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NEW RTW TRACK MACHINES
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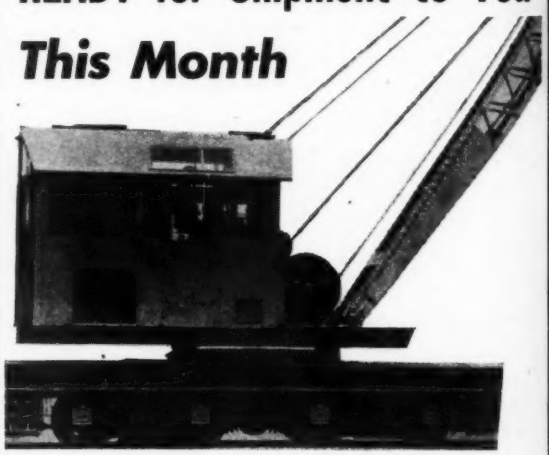

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Modern "30 tonner," diesel powered, Hydro-Ese clutches, big roomy cab, full vision.

Write or wire today.

THE BROWNING CRANE SHOVEL COMPANY
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Locomotive, Wagon, Tu-Control, and Truck Cranes

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Q&C Hand Throw Derails are of simple design, durable and effective. They may be adjusted in the brackets to fit a range of rail sections, eliminating the necessity of carrying many sizes in stock, thus reducing inventories.

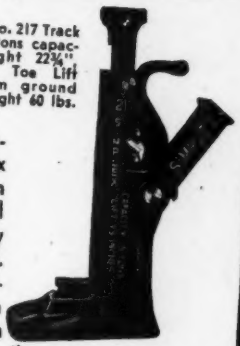
We also manufacture Sliding Type and Portable Derails. Specify Q&C Derails to assure safety and economy.

EXHIBITOR
BRIDGE & BUILDING – TRACK SUPPLY

THE Q AND C COMPANY
Chicago 5. New York 6. St. Louis 1

A Track Jack That Defies Tough Service

Simplex No. 217 Track Jack; 15 tons capacity. Height 22¾" Lift 13". Toe Lift 2⅛" from ground level. Weight 60 lbs.



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WORLD'S MOST COMPLETE LINE OF
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Templeton, Kenly & Co.
Chicago (44), Ill.
Better Safer Jacks Since 1899

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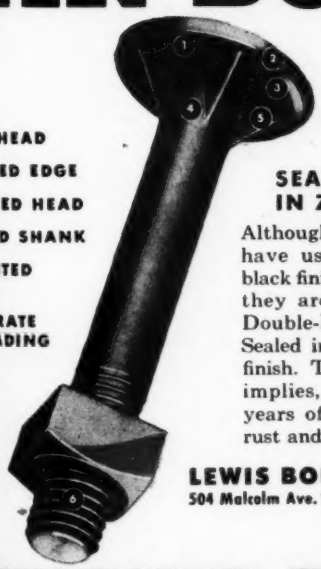

1 THIN HEAD
2 BEVELED EDGE
3 TAPERED HEAD
4 ROUND SHANK
5 PATENTED FINS
6 ACCURATE THREADING

SEALED-TITE IN ZINC BOLTS

Although many railroads have used thousands of black finished Sealtite bolts they are turning to our Double-Life Hot-Dipped, Sealed in Zinc, galvanized finish. This, as the name implies, does add many years of life by stopping rust and corrosion.

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504 Malcolm Ave. S.E., Minneapolis, Minn.

DESIGNED TO DO A BETTER JOB

THE ONLY MOBILE CRANE THAT OPERATES ON TRACKS AND OFF TRACKS

FOR ROADMASTERS — The ideal crane for maintenance of way operations, handling tracks, frogs, switches — available *where* you need it, *when* you need it.

FOR SHOPS AND STORES—The choice of America's railroads for handling freight, wheels, stores — and repairs.

The RAIL-O-ROAD KRANE KAR has 4 speeds forward, 4 reverse, automatic braking of load and boom, stability without stabilizers or jacks, and handles loads at sides or front. By retracting flanged wheels, the RAIL-O-ROAD KRANE KAR leaves the rails at a siding or crossing. On its rubber tires, it has unexcelled features for indoors and outdoors operation . . . low overhead clearance, short turning radius, unusual maneuverability in close quarters. Gasoline or Diesel, one to 10 ton cap., 11 to 35 ft. booms, solid or pneumatic tires. Agents in principal cities.

Send for Catalog #58

THE ORIGINAL SWING BOOM MOBILE CRANE WITH FRONT-WHEEL DRIVE AND REAR-WHEEL STEER

RAIL-O-ROAD KRANE KAR
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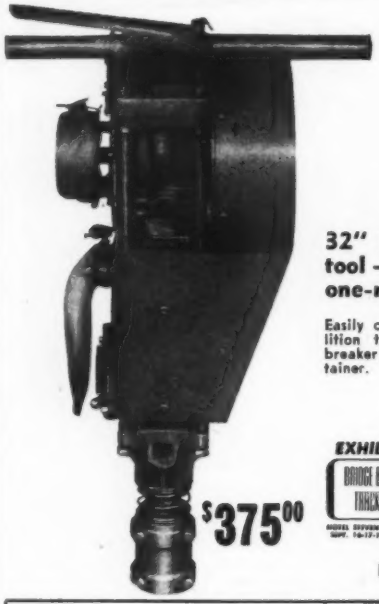

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SYNTRON
Gasoline Hammer
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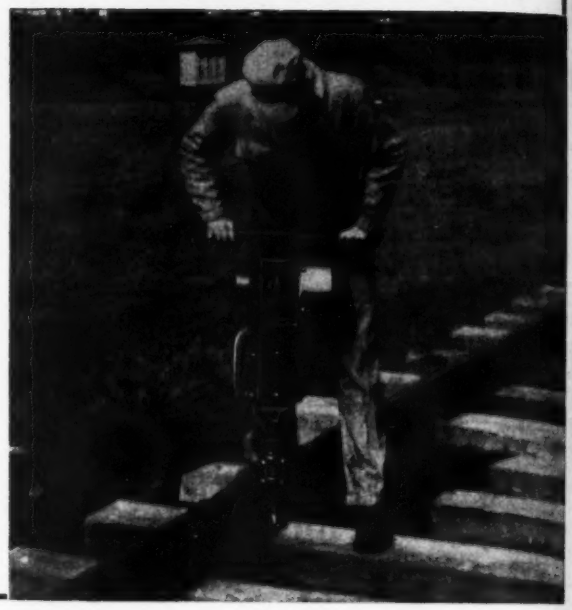

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